

Catalogue of borderline cases between articles and substances/mixtures

March 2023

ABC

Disclaimer

The catalogue of borderline cases of substances in articles is a compilation of cases agreed by the members of the Working group on borderline cases between articles and substances/mixtures ('Borderline Working Group' or BWG), consisting of representatives of the HelpNet, the Forum and the ECHA Secretariat.

The aim of the catalogue is to help authorities and duty-holders to reach conclusions on the assessment of borderline cases of substances in articles. However, users are reminded that the text of the REACH Regulation **is the only authentic legal reference** and that the information in this document does not constitute legal advice. Usage of the information remains under the sole responsibility of the user. The European Chemicals Agency does not accept any liability with regard to the use that may be made of the information contained in this document.

The catalogue should be regarded as a 'living' document. It is not exhaustive and further cases and assessments will be added over time, as they are agreed upon by the BWG members.

Version	Changes	
Version 1	First edition	

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1. Introduction

The Borderline Working Group was established in March 2021 under the HelpNet Steering Group with representatives of the REACH national helpdesks, Enforcement Forum members and ECHA. Its objectives are to:

- discuss difficult questions received by national helpdesks and ECHA on borderline cases between substances/mixtures and articles; and
- create a catalogue of detailed borderline substances/mixtures versus articles case assessments.

This document aims to assist users to determine whether an object fulfils the REACH article definition (REACH Article 3(3)) and only expresses the views of the authors.



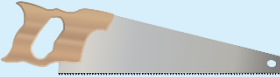


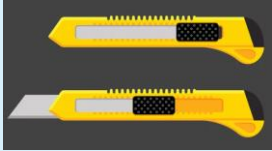
The assessments are carried out on a case-by-case basis and follow the guidelines of Chapter 2 of the *Guidance on requirements for substances in articles* (available from the [ECHA Guidance on REACH page](#)).

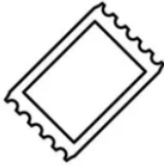



The detailed assessments and conclusions only apply to the identified and described objects. It does not necessarily mean that the assessment of similar objects would lead to the same conclusions. The description aims to clarify the particular object being assessed.

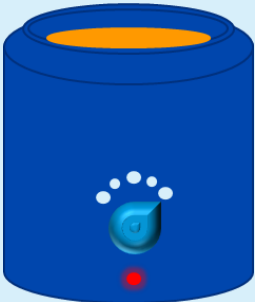


The objective of the catalogue is not only to document specific cases but also to find common elements among them. This allows for an evaluation of the potential for applying similar reasoning to other comparable cases. Suggestions for similar cases are provided as notes under the object name in the 'Object' column of the overview of agreed assessment of the borderline case between article and substance/mixture.





2. Overview of agreed borderline cases



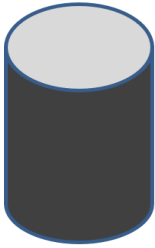
Table 1: Overview of agreed borderline cases




Object	Picture	Description	Conclusion	Detailed assessment
Drill bit	 <p>Figure 1: Twist drill bit</p>	<p>A twist drill bit is an item made from a sturdy material (usually metal) and shaped in a way that enables it to drill holes when rotating in objects made of different materials. It is a rotating cutting tool.</p>	Article	Link
[Note: similar objects	[Note: similar objects			
Chisel and scraper blades	 <p>Figure 2: Chisel blade</p>			
Saw blade	 <p>Figure 3: Saw blade</p>			
Rasp blade	 <p>Figure 4: Rasp blade</p>			
Knife blade	 <p>Figure 5: Knife blade</p>			
Retractable blade]	 <p>Figure 6: Retractable blade]</p>			

Object	Picture	Description	Conclusion	Detailed assessment
<p>Water-soluble plastic foil bag (to enclose a content)</p>	 <p>Figure 7: Water soluble film pouch (to enclose a content)</p>	<p>A water-soluble plastic foil bag to enclose a liquid or a solid..</p> <p>When used, in contact with water, the water-soluble plastic foil bag dissolves and releases the content.</p>	<p>Article</p>	<p>Link</p>
<p>Water soluble foil bag with content (e.g. water soluble tablets)</p>	 <p>Figure 8: Water soluble foil bag with solid and liquid content</p>  <p>Figure 9: Water soluble dishwashing tablets</p>	<p>The water-soluble plastic foil bag enclosing a liquid or a solid content dissolves when in contact with water and as a consequence breaks and releases its content.</p> <p>There are several types of such objects, the most common being water-soluble dishwashing tablets.</p>	<p>Combination of an article and a substance /mixture</p>	<p>Link</p>
<p>Wax of an electronic candle (flameless) for decoration</p>	 <p>Figure 10: Electronic candle</p>	<p>A decorative object.</p> <p>The (paraffin) wax hull is shaped in the form of a candle.</p> <p>It houses a lamp (and other electric components), which illuminates and works as a heating source, while the object is flameless.</p> <p>There is no combustion and no wax consumption.</p>	<p>Article</p>	<p>Link</p>


Object	Picture	Description	Conclusion	Detailed assessment
		<p>If the candle contains a fragrance infused into the paraffin wax, released as the wax warms up (the wax does not melt), the object is an article with 'a substance intended to be released'.</p>		
<p>Electronic wax "melter"* (flameless)</p> <p>[Note: similar objects Electric room freshener (diffuser) Electric insecticide (diffuser)]</p>	 <p>Figure 11: Electronic wax melter</p>  <p>Figure 12: Electric diffuser</p>	<p>The electronic wax "melter" is an air freshener (diffuser) and often a decorative object. The wax "melter" houses an electronic heating source or melter, e.g. a lamp, and a compartment with paraffin wax infused with a fragrance.</p> <p>This type of electronic wax "melter" is used to melt wax containing a fragrance to release the fragrance for scenting purposes.</p> <p>The molten wax is removed and replaced by new wax after all fragrance has been released.</p>	<p>Combination of an complex object and a mixture</p>	<p>Link</p>
<p>Coated electronic wax candle</p>	 <p>Figure 13: Coated electronic wax candles</p>	<p>The wax is shaped in the form of a candle (see ' Wax of an electronic candle') and is coated.</p> <p>Furthermore, the object contains a lamp (and other electric components), which illuminates and works as a heating source, therefore, it is flameless. There is no combustion and no wax consumption.</p>	<p>Article (coated article)</p>	<p>Link</p>

Object	Picture	Description	Conclusion	Detailed assessment
Coated conventional candle	 <p data-bbox="392 562 651 624">Figure 14: Burning candle</p>	<p data-bbox="715 322 1050 517">Moulded or dipped mass of wax or tallow containing a wick that may be burned. The wax or tallow is coated.</p>	<p data-bbox="1098 322 1273 517">Combination of an article (wick) and a mixture (wax and coating)</p>	<p data-bbox="1305 322 1369 353">Link</p>
Permanent magnets	 <p data-bbox="392 972 651 1034">Figure 15: Note on magnetic board</p>	<p data-bbox="703 685 1066 846">Permanent magnets are manufactured in different sizes and forms depending on their specific applications.</p> <p data-bbox="703 882 1082 1133">The materials to be used to produce permanent magnets must either be materials with permanent magnetic fields or materials with a susceptibility to be magnetised by applying an external magnetic field.</p>	<p data-bbox="1098 685 1246 748">Substance/ mixture</p>	<p data-bbox="1305 685 1369 716">Link</p>
Plastic or rubber granules (as infill material for sports pitches and playgrounds)	 <p data-bbox="392 1491 651 1554">Figure 16: Artificial turf surface</p>	<p data-bbox="703 1189 1050 1319">Plastic or rubber granules are used as soft infill materials to make sports pitches and playgrounds.</p> <p data-bbox="703 1355 1082 1574">The rubber granules are often made from end-of-life tyres (ELTs) that are broken up and ground into smaller pieces. The plastic granules result from shredded plastic objects.</p>	<p data-bbox="1098 1189 1246 1252">Substance/ mixture</p>	<p data-bbox="1305 1189 1369 1220">Link</p>
Pyrotechnic inflator of an airbag system	 <p data-bbox="392 1906 651 2002">Figure 17: Car interior with used airbag system</p>	<p data-bbox="703 1632 1066 1827">In the event of a collision, the pyrotechnic material in the inflator is ignited and gases are produced or released which inflate the airbag.</p> <p data-bbox="703 1863 1066 2016">The airbag system is a complex object. Within the airbag system, there is the inflator that contains a pyrotechnic mixture, the</p>	<p data-bbox="1098 1632 1262 1762">Combination of articles and a mixture</p>	<p data-bbox="1305 1632 1369 1664">Link</p>

Object	Picture	Description	Conclusion	Detailed assessment
		<p>propellant (chemical composition is highly important) that upon a trigger/ignition releases gases immediately.</p>		
<p>3D printing filament used as thermo-plastic raw material for 3D-printers</p>	 <p>Figure 18: 3D-printing filaments</p>	<p>Thermoplastic is the raw material for fused deposition modelling 3D-printers.</p> <p>There are many types of filaments available, with different properties, requiring different temperatures for printing.</p>	<p>Substance/mixture</p>	<p>Link</p>
<p>Soldering or welding metal wire</p>	 <p>Figure 19: Welding</p>	<p>Soldering and welding wires are metal alloys manufactured with the profile of a wire.</p> <p>They are used for welding or soldering, i.e. to join two or more items.</p>	<p>Mixture (alloy)</p>	<p>Link</p>
<p>Glow stick</p>	 <p>Figure 20: Glow stick</p>	<p>A glow stick consists of a closed glass tube in a plastic container. The glass tube contains a liquid and is surrounded by another liquid in the plastic container. When the inner glass tube is cracked, both liquids react producing chemiluminescence (light).</p>	<p>Combination of articles (containers) and mixtures</p>	<p>Link</p>
<p>Heat source for tobacco products, based on a chemical reaction</p>	 <p>Figure 21: Heat source for tobacco products based on a chemical reaction</p>	<p>The heat source is made of a powder mixture of charcoal, calcium peroxide and, to a small extent, binders. The powder is formed into a cylinder from moist agglomerates.</p> <p>The cylinders are given a specific shape that is precisely matched to the end-product.</p>	<p>Combination of an article (foil) and a mixture (charcoal and additives)</p>	<p>Link</p>

Object	Picture	Description	Conclusion	Detailed assessment
		<p>A metal foil is attached to this object on one of the flat sides, which ensures that the heat-generating part of the product is shielded from the tobacco in the end-product and thus prevents the generated heat from burning the tobacco instead of just heating it.</p>		
<p>Standard gold bar (or gold bullion or gold ingot)</p>	 <p>Figure 22: Gold bar</p>	<p>A gold bar (also called gold bullion or gold ingot) is a piece, usually a bar, of refined metallic gold (Au).</p> <p>A standard gold bar of specific gold purity and weight is held by central banks as gold reserves and held by private citizens and companies for investment.</p>	<p>Substance</p>	<p>Link</p>
<p>Perforated disk metal coffee filter (nonwoven)</p> <p>[Note: similar object funnel/cone-shaped metal coffee filter]</p>	 <p>Figure 23: Perforated disk metal coffee filter</p>  <p>Figure 24: Funnel metal coffee filter</p>	<p>Perforated reusable metal coffee filters are available, and are often used in certain coffee machines and other coffee maker devices.</p> <p>A non-woven metal perforated filter can be produced by perforating and cutting a suitable thin metal sheet, or by using other fabrication techniques.</p> <p>Despite the common name being coffee "filter", it works as a sieve – straining solids from a fluid in a single screen layer or barrier.</p> <p>This example does not cover filters made from cloths or meshes of metal wires or filaments.</p>	<p>Article</p>	<p>Link</p>

Object	Picture	Description	Conclusion	Detailed assessment
<p>Porous transversal (micro) filtration membrane</p>	 <p>Figure 25: Transversal filtration membrane</p>  <p>Figure 26: Transversal microfiltration membrane within a microfiltration device</p>	<p>A porous transversal (micro)filtration membrane is used for filtration – the separation of matter from other matter (e.g. in solutions, emulsions, and suspensions) through a multilayer lattice of an interposing medium.</p> <p>Porous transversal (micro)filtration membranes have a large number of applications, where the feed flows transversally through the membrane (from upper surface to lower surface of the multilayer lattice of the membrane).</p> <p>There are different types of porous membranes, made of different base polymers: e.g. cellulose, polyamides, polyols, polyphenols, polyvinylidene fluoride (PVDF), poly(tetrafluoroethylene) (PTFE), polypropylene (PP), and polyethylene (PE). There are also different fabrication processes.</p> <p>The pore structure, cross-section morphology, and thickness of the fabricated membrane is dependent on several factors, for instance the selection of polymer, polymer concentration in the casting solution, viscosity of the casting solution, solvent, non-solvent, additives (including pore formers), temperature, and fabrication process.</p>	<p>Substance/ mixture</p>	<p>Link</p>

Object	Picture	Description	Conclusion	Detailed assessment
<p>Perforated paper coffee filter</p>	 <p>Figure 27: Paper coffee filter</p>	<p>A perforated paper coffee filter is used for brewing coffee. It usually has a single use, after which it is disposed. The paper used has a specific morphology (microstructure) and is perforated with needles.</p> <p>Paper coffee filters are made from crepe paper (crinkled), where pulp with coarse long fibres is usually used. The paper is treated to increase surface area and to provide a crinkly crepe-like texture. It can be bleached or unbleached.</p> <p>Paper coffee filters are available in different shapes, to fit on different coffee making devices or set-ups, thicknesses, and pore sizes.</p>	<p>Article*</p> <p><i>*Note: This conclusion is achieved if the main function is <u>sieving</u> and not filtration. For more information, consult the detailed assessment.</i></p>	<p>Link</p>

3. Table of detailed assessment of agreed borderline cases

Table 2: Detailed assessment of agreed borderline cases

Object	Step 1: Identify the function of the object (Function: the purpose for which an object is to be used)	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition? Yes: considered an article No: considered a substance/mixture or a combination of a substance/mixture and article(s)	Step 3 Object contains substance/mixture than can be separated from the object? Yes: → Step 4 No: → Step 6	Step 4 Q4a-c Mostly yes: substance/mixture <u>and</u> article Mostly no: → Step 5	Step 5 Q5a-c Mostly yes: article Mostly no: substance/mixture <u>and</u> article	Step 6 Q6a-d Mostly yes: article Mostly no: substance/mixture	Conclusion
Drill bit Note: Based on this assessment, the same conclusion is reached for other similar objects such as: 1a. Chisel and scraper blades 1b. Saw blade 1c. Rasp blade 1d. Knife blade 1e. Retractable blade	The function is: Cutting and removing material (to make a hole)	Yes. The surface and the shape are crucial, e.g. cutting edge and spiral indentation. They are more important for the function (cutting and removing material) than the chemical composition. The chemistry of the material (the drill bit is made of) is important to provide the necessary performance and durability properties, such as hardness and wear resistance during use. However, it does not determine its function because the properties of the material are related to performance, durability and quality of the result. They do not determine the result in itself.	n.a.	n.a.	n.a.	n.a.	Article

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
<p>Water-soluble plastic foil bag (to enclose a content)</p>	<p>The function is: Containment and delivery (during use) of the content (e.g. detergent)</p> <p>The containment is done by enclosing, holding, preventing releases of the content, while protecting that content (e.g. detergent) and preventing its direct contact with the skin. It also facilitates handling and transportation of the content. It delivers the content during use by dissolving itself in water.</p>	<p>Yes. The shape, surface and design are more important for the function than the chemical composition as explained generically in subchapter 2.5 of the <i>Guidance on requirements for substances in articles (SiA Guidance)</i>.</p> <p>The water-soluble plastic foil bag, which works as packaging for the content, is considered an article under REACH in its own right (see <i>Example 18: Polymer processing</i> in Appendix 4 of the SiA Guidance).</p> <p>Its solubilisation into water allows the delivery of the content and determines its end of service life.</p>	n.a.	n.a.	n.a.	n.a.	Article
<p>Water soluble foil bag with content (e.g. water soluble tablet)</p>	<p>The functions of the object as a whole (e.g. water soluble tablets) are: Deliver or release the content.</p>				n.a.	n.a.	Combination of an article (the bag) and a substance/mixture (the content)
<p>Wax of an electronic candle (flameless)</p>	<p>The functions of the wax hull are:</p> <ul style="list-style-type: none"> - Decoration; - Lamp holder; - Housing for electric components - Accessory – release of a fragrance (scenting) 	<p>Yes. The shape and design of the wax hull are more important for the functions than the chemical composition of the wax mixture.</p> <p>In those cases where there is a scenting function, such function is an accessory function as defined in subchapter 4.1 of the <i>SiA Guidance</i>. The release of the fragrance substance or substances from the wax hull, which does not melt, is boosted by the heat released by the lamp. The release of a</p>	n.a.	n.a.	n.a.	n.a.	Article with intended release of a substance or substances according to REACH Article 7(1).

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
		<p>substance or substances is intended, because a fragrance is infused into the wax the hull is made of, and occurs under normal or reasonably foreseeable conditions of use as explained in the above mentioned subchapter of the <i>SIA Guidance</i>.</p> <p>Therefore, the wax hull of an electronic candle as described in this example is considered an article with intended release of a substance or substances (fragrance) according to REACH Article 7(1).</p>					
<p>Electronic wax “melter” (flameless)</p> <p>[Note: similar objects Electric room freshener (diffuser) Electric insecticide diffuser]</p>	<p>The functions are scenting and decoration.</p>	<p>The wax and its container or base is somewhat relevant for the decoration function, but it is key for the scenting function, i.e. the scenting function is the most important concerning the wax (chemical composition of interest).</p> <p>Scenting and decoration are both main functions. However, the scenting function is directly related with the wax composition – the chemical composition of interest, which is consumed upon use, preventing the scenting function. The decoration function is directly related with other components of the “melter”.</p> <p>Therefore, the wax holder acts as a container for the wax for release or controlled delivery of the fragrance into the air.</p> <p>Therefore, the wax holder in an electronic wax “melter” (flameless) for scenting (air freshener), is regarded as a combination of an article (container) and a mixture (wax with fragrance).</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>Combination of an article (container) and a mixture (wax)</p>

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
Coated electronic wax candle	The main function is decoration.	Yes. The wax is shaped in the form of the candle and the coating is completely incorporated in the shaped article (see 'Wax of an electronic candle'). It is a coated article (see scenarios III-A) and III-B) in table 5 of the <i>SiA Guidance</i>)	na	Na	na	na	Article
Coated conventional candle	The candle is lit to sustain a flame. The wick does not sustain the flame, it carries the molten wax to the centre of the flame, the burning of the wick is a secondary effect.	No. A conventional wax candle is a combination of an article and a substance/mixture. Therefore, a coated wax candle is a combination of an article and a mixture. In this case, the article is the wick. (The coating and the wax are either: - 2 different mixtures, - 2 substances, or - one substance and one mixture).	n.a	n.a.	n.a.	n.a	Combination of an article (wick) and a mixture (wax and coating)
Permanent magnets	The function is: attract or repel other magnetic objects	No. Permanent magnets are used due to their magnetic properties, e. g. in cupboards to keep a door closed. They attract or repel magnetic objects through a magnetic force. <i>According to the Guidance on requirement for substances in articles Chapter 2.2: the magnetic properties of the permanent magnet are strongly related to its chemical composition and determine its function. Therefore, a permanent magnet is regarded as a substance or mixture.</i> (See Q&A 1292 on ECHA's website)	n.a	n.a	n.a	n.a	Substance/mixture
Plastic or rubber granules (as infill material for sports pitches and playgrounds)	The function is: A raw material or ingredient (filler) [to make (synthetic) pitches and playgrounds].	No. Granulates are solid particles produced in different sizes, i.e. they do not have special shapes or surfaces. They can be made from rubber or other vulcanised or polymeric material of recycled or virgin origin, or obtained from a natural source. For its function, the chemical composition of	n.a	n.a	n.a	n.a	Substance/mixture

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
		<p>the granulate is more important for the function than the shape/surface/design. As an infill material in pitches and playgrounds, it cushions the ground (shock absorption and traction) which are directly related to their softness, a physical property directly related with the chemical composition of the granules.</p> <p>Therefore, the plastic or rubber granules are regarded as a substance or mixture.</p>					
<p>Inflator of an airbag system</p>	<p>Main function(s) of the inflator: generation and release of gas(es)</p> <p>Chemical composition in question: pyrotechnic mixture (propellant)</p>	<p>No. The main function of the pyrotechnic inflator (generate and release gases) is mostly dependant of a chemical reaction (non-detonative self-sustaining combustion/explosion). The output of the reaction is almost coincidental with the function of the inflator (generate gases accompanied by a large increase in volume or pressure).</p> <p>It seems that the chemical composition of the pyrotechnic mixture (chemical composition of concern) is the most important element for the function of the inflator. Therefore, it should be considered as a combination of articles (container) and a mixture (pyrotechnic mixture).</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>Combination of articles and a mixture (pyrotechnic mixture)</p>
<p>3D printing filament used as thermoplastic raw material for 3D printers</p>	<p>The function is a raw material for 3D printing</p>	<p>No. A 3D printing filament is a raw material for 3D printing. A filament is made from a melted thermoplastic polymer, often mixed with other additives.</p> <p>During 3D printing, the filament is heated above its glass transition temperature, losing its shape, and consumed during use, to construct the 3D object.</p> <p>From this, and notwithstanding the convenience for the specific shape of a 3D</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>Substance/mixture</p>

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
		<p>printing filament for handling and feeding the 3D printer, it is clear that the chemical composition of the wire is more important for its function than the shape, surface or design.</p> <p>In conclusion, 3D printing filament is to be considered a substance or a mixture under REACH. The assessment of such filament is not covered by example 18 of the appendix 4 to the 'Guidance on requirements for substances in articles'.</p>					
Soldering or welding metal wire	The function is to join or hold two or more articles or objects together.	<p>No. During application in joining two or more articles or objects together by welding or soldering, the welding or soldering metal wire as a whole is fused, losing its shape, and consumed during use.</p> <p>The chemical interaction and compatibility between the molten flux and the metal substrates is to be joined, as well as the (eventual) prevention of oxidation of the metals to be joined, during the joining process (welding or soldering) are the most important properties for the function of a welding or soldering wire.</p> <p>From the above, and notwithstanding the convenience for the specific shape of a welding or soldering wire for handling and applying a fusible welding or soldering material, it is clear that the chemical composition of the wire is more important for its function than the shape, surface or design.</p> <p>Note that alloys are regarded as 'special mixtures' according to REACH Article 3(41) and recital 31, as explained in Q&A 31 on ECHA's website.</p> <p>In conclusion, a welding or soldering wire is</p>	n.a.	n.a.	n.a.	n.a.	Mixture (alloy)

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
		<p>to be considered a mixture (alloy) under REACH.</p> <p>The assessment of such wire is not covered by example 16 of the of the appendix 4 to the 'Guidance on requirements for substances in articles'.</p>					
Glow stick	The function is to emit light	No. The function is achieved by mixing two mixtures that, when combined, undergo a chemiluminescent reaction emitting light. The function is thus determined to a greater degree by the chemical composition of the mixtures rather than the shape of the object.	n.a.	n.a.	n.a.	n.a.	Combination of articles (containers) and mixtures
Heat source for tobacco products based on a chemical reaction	<p>The functions of the carbon heat source are to undergo an exothermic reaction (combustion) and transfer heat.</p> <p>The function of the foil is to create a barrier between the carbon heat source and the tobacco, preventing direct contact and the burning of the tobacco</p>	<p>No. The main function of the object is only achieved through an exothermic chemical reaction, which shows that the chemical composition is key for the function. Other characteristics relevant for the function are the surface area and the porosity to allow the inflow of air, which are closely related with the chemical composition.</p> <p>The foil is given a special shape and is an article which, however, needs to have a high thermal conductivity.</p> <p>The chemical composition of the carbon heat source seems to be more important for the identified function. Therefore, it is considered a combination of an article (foil) and a mixture</p> <p>The mixture is fully consumed upon use and the object is discarded.</p>	Yes, mixture can be separated	4a yes 4b no 4c yes	n.a.	n.a.	Combination of an article and a mixture

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
<p>Standard gold bar (or gold bullion or gold ingot)</p>	<p>The function is: to store value</p>	<p>No. The value stored by the gold bar is intrinsically linked to the chemical element gold (Au) i.e. the value of metallic gold stored in a gold ingot does not depend on its physical properties shape, surface or design.</p> <p>To achieve its function (to store value), the gold bar is required to have a very high degree of metallic gold purity. Furthermore, it is also required to have the density, the colour and the inertness (very stable against wear (e.g. corrosion/oxidation) of metallic gold. These are all intrinsic properties related to metallic gold.</p> <p>In conclusion, even if the shape, surface and design of a standard gold bar facilitates identification, handling, storage and transportation, it is the chemical composition that determines to a greater degree its function: to store value.</p> <p>Therefore, a gold bar must be seen as a substance according to the REACH Article 3(1) definition.</p> <p>Please note that gold (Au) (EC 231-165-9, CAS 7440-57-5) is registered under REACH.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>Substance</p>
<p>Perforated disk metal coffee filter (nonwoven)</p>	<p>The function is: to retain coffee grounds - sieving</p> <p>Sieving means, in this case, a two-dimensional mechanical or physical size exclusion separation at a single screen layer (a sieve), e.g. perforated sheet</p>	<p>Yes. The sieving function (retention of coffee grounds) is determined by the size of the holes (e.g. diameter) in the perforated screen layer or barrier. In this case, the size of the holes in the perforated metal disk which works as a coffee sieve. Any oversized solid particles contained in the "feed" (suspension of ground coffee in water), cannot pass through the perforated metal disk holes (screen), being retained above the disk (used coffee grounds), while the fluid (brewed coffee) passes through the holes.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>n.a.</p>	<p>Article</p>

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
	or woven mesh.	<p>Therefore, the shape, surface and design are more important for the sieving function of the perforated disk metal coffee filter (nonwoven) than its chemical composition.</p> <p>The perforated disk metal coffee filter (non-woven) is an article under REACH.</p>					
<p>Porous transversal (micro) filtration membrane</p>	<p>The function is filtration and sorption.</p> <p>Filtration means, in this example, the mechanical or physical three-dimensional separation of solid matter from other matter through a multilayer lattice of an interposing medium.</p> <p>Filtration in this case differs from sieving (as defined in 'Perforated paper coffee filter'), because the separation occurs through a three-dimensional multilayer lattice of an interposing medium (membrane), and not only at the upper surface (the outermost layer).</p>	<p>No. In filtration, one or more components are separated from a fluid (feed), based primarily on size differences of solid particles. The main difference between filtration and sieving relies on the screening barrier used. In addition, often sorption also plays a role on the separation when a membrane is used, i.e. separation of components based on physical, chemical and physicochemical interactions. For instance, a membrane separates not only solid particles, but also hydrophobic substances from an aqueous feed. The fluid that passes through the membrane is called filtrate.</p> <p>The most important properties for the function of a porous transversal (micro)filtration membrane (separation of one or more components from a fluid (feed)) are:</p> <ul style="list-style-type: none"> - porosity, pore size distribution and pore shape; - ratio between accessible and inaccessible pores; - hydrophilicity/hydrophobicity of the membrane; - tensile strength; - surface; and - thickness. <p>It is important to highlight that during the fabrication process of a membrane, no special surfaces are given to the membrane,</p>	n.a.	n.a.	n.a.	n.a.	Substance/mixture

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
		<p>since they result from the casting (demixing and/or precipitation), and the thickness may have some variabilities. Typically, the polymer is dissolved in a casting solution, which undergoes phase separation by induced demixing and/or precipitation during casting in a support. The casted membrane is dried and rolled in a master roll. The porous membrane roll is then further cut into different dimensions (shapes), usually disks of different diameters.</p> <p>The intrinsic properties of the material, the porosity and microstructure are more relevant for the function than the special shape (thickness) of the object given during production. The characteristics that are relevant to perform the function are mostly related to characteristics that result from the chemistry of the materials the filter (membrane) is made of or from the fabrication process used.</p> <p>Following the workflow in Section 2.3 of the 'Guidance on requirements for substances in articles', the Step 2 question can be answered with 'no' (based on Section 2.2), i.e. the filter is thus a substance or mixture.</p> <p>Therefore, a porous transversal (micro)filtration membrane is regarded as a substance/mixture because the chemical composition is the determinant factor for the function.</p>					
Perforated paper coffee filter	The main function is to retain coffee grounds. Therefore, both sieving (more important) and filtration are functions of a perforated coffee	Yes. The retention of coffee grounds by the perforated paper coffee filter seems to be determined by the size of the holes (e.g. diameter) in the perforated paper, but also by the interstices between the coarse long paper fibres.	n.a.	n.a.	n.a.	n.a.	Article*

Object	Step 1: Identify the function of the object	Step 2: Are shape/surface/design more relevant for the function of the object than the chemical composition?	Step 3	Step 4	Step 5	Step 6	Conclusion
	<p>filter (see 'Porous transversal (micro) filtration membrane' and 'Perforated paper coffee filter'). An accessory function of perforated paper coffee filter is the separation of fatty molecules such as diterpenes from the brewed coffee.</p>	<p>The perforated paper coffee filter, taking into account the size of the coffee grounds, seems to work more as a sieve for the coffee grounds (see ' Perforated paper coffee filter') than as a filter (see 'Porous transversal (micro) filtration membrane'). The morphology of the paper fibres in the filter are more like a mesh than as a porous material.</p> <p>The retention of diterpenes by perforated paper coffee filter is an accessory function, and not the main function, which is sieving.</p> <p>Therefore, a perforated paper coffee filter is regarded as an article.</p> <p>*Note: If a manufacturer of a paper coffee filter considers that e.g. morphology, microstructure, hydrophilicity/ hydrophobicity of the paper, tensile strength and other properties of the paper are more important for the function, then they should consider the coffee filter as a substance/mixture as described in ' Porous transversal (micro) filtration membrane' and not an article.</p>					

4. Appendix: List of figure sources

Figure	Source
Figure 1: Twist drill bit	https://pixabay.com/de/photos/bohrer-bohrmaschine-metall-1827131/ accessed on 30/09/2020, author: LeoNeoBoy
Figure 2: Chisel blade	https://www.vecteezy.com/photo/2545010-set-of-chisels-on-the-workbench , accessed on 30/09/2020, author: Yurii Romanov
Figure 3: Saw blade	https://pixabay.com/vectors/handsaw-tool-hand-saw-wood-work-159622/ , accessed on 16/11/2022, author: OpenClipart-Vectors / 27376
Figure 4: Rasp blade	https://pixabay.com/photos/files-rasps-tools-set-iron-steel-4463773/ , accessed on 16/11/2022, author: papazachariasa / 454 images
Figure 5: Knife blade	https://burst.shopify.com/photos/japanese-kitchen-knife-and-tomatos , accessed on 30/09/2020, author: Rohann Agalawate
Figure 6: Retractable blade	https://www.freepik.com/premium-vector/cutter-knife-vector-blade-paper-craft-utility-stationery-office-craft-cut-razor_25448739.htm , accessed on 20/10/2022, author: kolonko
Figure 7: Water soluble film pouch (to enclose a content)	Vieira Prazeres, T. J. 2022
Figure 8: Water soluble foil bag with solid and liquid content	https://picjumbo.com/putting-dishwashing-capsules-in-a-dishwasher/ accessed on 10/03/2023 author: Viktor Hanacek
Figure 9: Water soluble dishwashing tablets	https://www.istockphoto.com/fi/valokuva/pesuaine-kapseli-gm844466276-138359293?phrase=dishwasher%20capsules accessed on 6/03/2023 author: s-cphoto
Figure 10: Coated electronic wax candles	https://www.pexels.com/photo/three-pillar-candles-370883/ , accessed on 06/02/2023, author: hafid
Figure 11: Electronic candle	Christmas decor with flaming candle at home · Free Stock Photo (pexels.com) , accessed on 06/02/2023, author: Laura James
Figure 12: Electronic wax melter	Frauman, E. 2023
Figure 13: Electric diffuser	Aroma Fragrance Diffuser - Free photo on Pixabay accessed on 6/02/2023, author asundermeier
Figure 14: Burning	https://pixabay.com/de/photos/kerze-flamme-flimmern-kerzenlicht-

- candle [452966/](#), accessed on 05/10/2020, author: Denise Chaney
- Figure 15: Note on magnetic board <https://pixabay.com/de/photos/postit-haftnotiz-gelb-schl%C3%BCssel-3237369/>, accessed on 03/11/2020, author: globenwein, the image was modified
- Figure 16: Artificial turf surface <https://pixabay.com/de/photos/kunstrasen-mittelfeld-fu%C3%9Fball-1436614/>, accessed on 01/10/2020, author: Stefano Ferrario
- Figure 17: Car interior with used airbag system <https://pixabay.com/de/photos/crashtest-kollision-auffahrunfall-1620608/>, accessed on 30/04/2021, author: Marcel Langthim
- Figure 18: 3D printing filaments <https://www.istockphoto.com/en/photo/3d-printer-plastic-filament-pools-of-black-red-grey-white-thermoplastic-wires-for-gm1246346330-363179931?phrase=printing%20filaments> accessed on 6/03/2023 author: Nature, food, landscape, travel
- Figure 19: Welding https://unsplash.com/photos/idffd_L5rQ, accessed on 16/11/2022, author: Salvador Escalante
- Figure 20: Glow stick <https://pixabay.com/de/photos/knicklichter-bunt-licht-leuchten-693818/>, accessed on 01/10/2020, author: Hans Braxmeier
- Figure 21: Heat source for tobacco products based on a chemical reaction Vieira Prazeres, T. J. 2022
- Figure 22: Gold bar <https://unsplash.com/photos/Y9U4XZYbSQ4> accessed on 20/10/2022, author: Jingming Pan
- Figure 23: Perforated disk metal coffee filter <https://unsplash.com/photos/1SUtSGT3TD0>, accessed on 06/02/2023, author: cafeconchetto
- Figure 24: funnel metal coffee filter Tunnela, O. 2022
- Figure 25: Transversal filtration membrane <https://unsplash.com/photos/KJVmGWFEb8E>, accessed on 20/10/2022, author: RephiLe water
- Figure 26: Transversal microfiltration membrane within a microfiltration device <https://unsplash.com/photos/sw99zUK8hCc>, accessed on 20/10/2022, author: RephiLe water
- Figure 27: Paper coffee filter <https://unsplash.com/photos/rwwMB7kTNes>, accessed on 07/03/2023, author : Devin Avery



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