**Classifying in Physics**

**1. Discuss these questions:**

* 1. Do you drink tea / coffee every day? Which kind?
  2. What's your favourite drink? How much of it do you drink every day / week?
  3. How often do you go out for a drink? Is there a place that you would recommend?
  4. Have you ever left a pub/restaurant without paying?
  5. What is the weirdest drink that you have ever had/heard about?

1. **The following is a list of drinks. Try to complete the classification diagram below with the following words:**

soft, coffee, cold, still, lager, vodka, tea, cocoa, tonic, water, juice, wine, coca-cola

1. **Discussion points – classification.**
2. How are the above beverages classified?
3. How can you classify people at an academic institution?
4. What classifying units can you use in physics?
5. **Read the following passage.**
6. **Then classify the matter, using the information in the text.**

# State of matter

**States of matter** are the distinct forms that different [phases](http://en.wikipedia.org/wiki/Phase_%28matter%29) of [matter](http://en.wikipedia.org/wiki/Matter) take on. [Solid](http://en.wikipedia.org/wiki/Solid), [liquid](http://en.wikipedia.org/wiki/Liquid) and [gas](http://en.wikipedia.org/wiki/Gas) are the most common states of matter on Earth. However, much of the [baryonic matter](http://en.wikipedia.org/wiki/Baryonic_matter) of the universe is in the form of hot [plasma](http://en.wikipedia.org/wiki/Plasma_%28physics%29), both as rarefied [interstellar medium](http://en.wikipedia.org/wiki/Interstellar_medium) and as dense [stars](http://en.wikipedia.org/wiki/Star).

Historically, the distinction is made based on qualitative differences in bulk properties. Solid is the state in which matter maintains a fixed volume and shape; liquid is the state in which matter maintains a fixed volume but adapts to the shape of its container; and gas is the state in which matter expands to occupy whatever volume is available.

The state or *phase* of a given set of matter can change depending on [pressure](http://en.wikipedia.org/wiki/Pressure) and [temperature](http://en.wikipedia.org/wiki/Temperature) conditions, transitioning to other phases as these conditions change to favor their existence; for example, solid transitions to liquid with an increase in temperature. A phase transition indicates a change in structure and can be recognized by an abrupt change in properties.

More recently, distinctions between states have been based on differences in molecular interrelationships. Solid is the state in which intermolecular attractions keep the molecules in fixed spatial relationships. Liquid is the state in which intermolecular attractions keep molecules in proximity, but do not keep the molecules in fixed relationships. Gas is the state in which molecules are comparatively separated and intermolecular attractions have relatively little effect on their respective motions. [Plasma](http://en.wikipedia.org/wiki/Plasma_%28physics%29) is a highly ionized gas that occurs at high temperatures. The intermolecular forces created by ionic attractions and repulsions give these compositions distinct properties, for which reason plasma is described as a fourth state of matter.

Forms of matter that are not composed of molecules and are organized by different forces can also be considered different states of matter. [Superfluids](http://en.wikipedia.org/wiki/Superfluids) (like [Fermionic condensate](http://en.wikipedia.org/wiki/Fermionic_condensate)) and the [quark–gluon plasma](http://en.wikipedia.org/wiki/Quark%E2%80%93gluon_plasma) are examples.

**MATTER**

**/ / | | \ \**

1. **Now read the text above once again and find words corresponding with the definitions above. Each definition describes ONE word only, unless stated otherwise;**

I par:

-relating to any of a class of elementary particles that have a mass greater than or equal to that of the proton;

-between the stars

II par:

-connected with how good something is, rather than how much of it there is;

-qualities or characteristics that something has;

-keeps in a specified state, position, etc.;

-adjusts to different conditions, changes to suit new conditions;

-becomes greater in size/volume

III par:

-to support, facilitate;

-growth, rise;

-marks, means, demonstrates;

-sudden

IV par:

-interconnections, interdependence

-settled

-nearness in space or time, closeness

-somewhat, rather

-takes place, is present

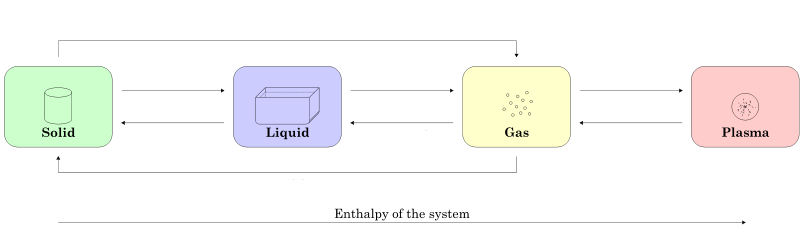
-the forces that act between bodies of like electric charge or magnetic polarity, tending to separate them

V par:

-made of (2-word phrase)

-seen as, regarded as

1. **Look at the picture and label all the phase transitions (according to arrows). Then describe the transitions to your partner.**



1. **Watch the video and complete the sentences below with the very words from the listening (1 word per gap):**
   1. When water is boiling, evaporation \_\_\_\_\_\_\_\_ on its surface.
   2. The \_\_\_\_\_\_\_\_\_\_ in this boiling water are made up of water vapour.
   3. The molecules are pulled \_\_\_\_\_\_\_\_ to become a gas.
   4. Each liquid boils at a \_\_\_\_\_\_\_\_\_\_ temperature.
   5. The average melting points of rocks are about \_\_\_\_\_\_\_\_\_\_ ˚C.
   6. Most liquids take up less \_\_\_\_\_\_\_\_ when they freeze.
   7. When water freezes, its molecules form \_\_\_\_\_\_\_\_\_ but hollow rings.
   8. Dry ice is the solid \_\_\_\_\_\_\_\_\_\_ of CO2
   9. It causes water vapour in the air to \_\_\_\_\_\_\_\_\_\_\_ into a fine, white mist.
   10. When it is \_\_\_\_\_\_\_\_\_\_ to warm air, dry ice changes directly into an invisible gas.
2. **Presentations.**

Work in small groups. Each group will get a text describing an issue from the area of physics. Read the text and point out all the things that are classified.

Then draw your diagram on a poster, use the vocabulary from the tables below to help you.

(e.g. *may be divided into four parts, can be classified as…)*

Remember to have all the important stages in your presentation:

**1. welcoming the audience**

**2. introduction of the speakers and the topic of the presentation**

**3.presenting the topic with the use of visuals**

**4. conclusion**

**Don't forget to let your partner speak!**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Matter | is/are  may be  can be  could be | classified  grouped  divided  arranged  categorized | into | divisions  groups  types  classes  categories  classifications |
| classified  categorized  classed  grouped | as | solid, liquid, gas or plasma |

|  |  |  |
| --- | --- | --- |
| There are (three/ four/ many) | types  kinds  classes  categories | of matter |

|  |  |  |
| --- | --- | --- |
| Oxygen is | a type  a kind  a form  an example | of gas that… |

|  |  |  |
| --- | --- | --- |
| Everything | is made up of  is composed of  consists of | matter/ molecules |

|  |  |  |
| --- | --- | --- |
| Different states of matter | include  comprise | Superfluids and the quark-gluon plasma |

Sources:

**Adapted from:** *Conversation questions for the ESL Classroom .***available at** http://iteslj.org/questions/

[www.wikipedia.org](http://www.wikipedia.org))

Exercises I, II, VII – adapted from A.Rozkošná