GRAYS TUITION CENTRE – Online Tutoring

WEEK: 10

Week Beginning: (25/05/20)

Subject: SCIENCE

Year: 7

Lesson Objective:

- To learn the properties of non-metals.

Keywords/ Concepts

- Conductors
- Strong
- Shiny
- Sonorous
- Malleable
- Ductile
- Density
- Alloy

Class Questions

Homework

- Worksheets

Additional Notes

- Self-mark h/w from week 9

Answers to h/w (week 9)

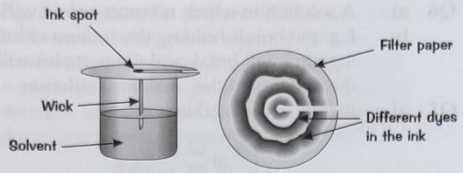
Pages 91-94 — Separating Mixtures

Q1 Salt solution — E
Crude oil — D
Coffee — E
Sugar solution — E
Muddy water — F and E

Q2 E.g. make sure the lawn sand is a fine powder — if there are big lumps, grind them up with a mortar and pestle. Fertiliser is soluble and sand isn't, so filtration and evaporation can be used to separate the two. Weigh a sample of lawn sand and a piece of filter paper separately. Mix the sample with water in a beaker so that the fertiliser dissolves. Filter the contents of the beaker using filter paper and a funnel — the sand particles are too big to pass through the filter paper but the fertiliser is dissolved in the water and will pass through. Wash the sand left in the filter paper with more water to remove all fertiliser. Dry the sand and filter paper, and weigh them. Subtract the weight of the filter paper to find the weight of the sand. If it's half the weight of the original sample, then the other half must have been fertiliser and she hasn't been cheated.

Q3 **a)** simple distillation
b) The water is a gas, so it must be cooled and condensed into a liquid so it can be collected.
c) The water in the ink boils off, cools and is collected in the beaker.
d) E.g. sea water

Q4 **a)**



b) E.g. the solvent soaks through the paper because of the wick. Different dyes in the ink are washed through the paper by the solvent at different rates. Some dyes in the ink will stick to the paper and others will dissolve in the solvent. The dyes stop at different points, forming different-sized rings.

Q5 **a)** 2
b) Paul
c) Paul's ink and the note ink were both made up of two dyes and the results show these dyes travelled the same amount along the filter paper — they're probably the same ink.

Q6 **a)** Coolest bit of the column — B
Condenser — F
Hottest part of column — D
0-400 °C Thermometer — A
Fractionating column — C
Collected fractions — G
Crude oil — E
b) Different liquids boil off at different temperatures around their own boiling point. The fractionating column ensures that the "wrong" liquids condense back down, and only the liquid boiling at the temperature on the thermometer will make it to the top and be collected. When each liquid has boiled off, the temperature reading rises until the next fraction starts to boil off.

Q7 **a)** To check the purity of the water. Pure chemical substances have fixed melting and boiling points.
b) The water was pure.
c) The water contained impurities that caused it to boil above the normal boiling point and freeze below the normal freezing point.

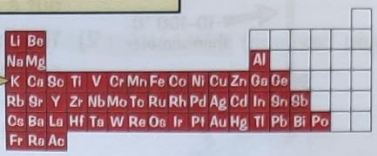
Classwork

Properties of Metals

Metals are jolly useful. We use them all the time in bendy wires, bridges, musical instruments and more. So it's only fair that you learn these two pages of glorious facts about them in return...

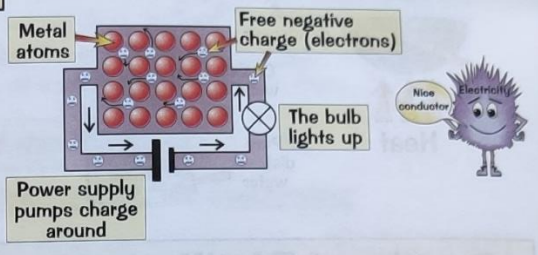
1) Metals Can be Found in the Periodic Table

1) Most of the elements in the periodic table are metals.
2) Some are shown here in red, to the left of the zig zag.



2) Metals Conduct Electricity

1) Metals all allow electrical charge to pass through them easily.
2) The moving charges are negatively-charged particles called electrons.
3) Moving charges are otherwise known as electric current.



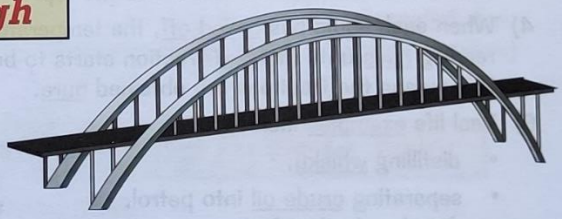
3) Metals Conduct Heat

1) They let thermal energy pass through.
2) The "hot" particles vibrate strongly. This is passed on through the metal.

Lots of movement — Little movement

4) Metals are Strong and Tough

1) Metals have high tensile strength (they can be pulled hard without breaking).
2) This is because there are strong forces between metal atoms that hold them together.
3) So they make good building materials.

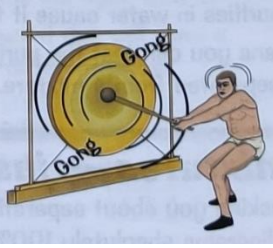


5) Metals are Shiny When Polished

Polished or freshly cut metals give strong reflection of light from their smooth surface. This makes them look shiny.

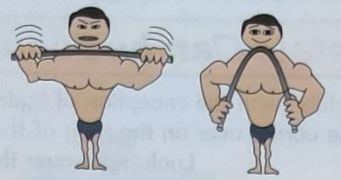
6) Metals are Sonorous

This means they make a nice "donnnnggg" sound when they're hit. If you think about it, it's only metals that do that — you could make a gong out of plastic, but it wouldn't be much good.



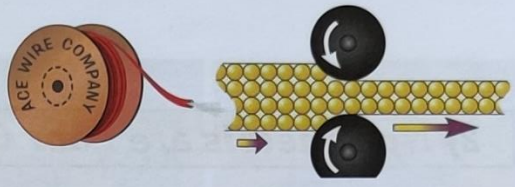
Properties of Metals

7) Metals are Malleable



1) Metals are easily shaped (malleable) because the atoms in metals can slide over each other.
2) This means metals can be hammered into thin sheets or bent — all without shattering.

8) Metals are Ductile



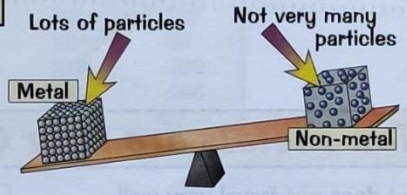
1) This means they can be drawn into wires.
2) Metals aren't brittle like non-metals (see page 45) are. They just bend and stretch.

9) Metals have High Melting and Boiling Points

1) A lot of heat energy is needed to melt metals.
2) This is because their atoms are joined by strong forces.
3) The table shows how hot they have to get to melt.

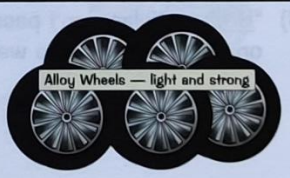
Metal	Melting Point (°C)	Boiling Point (°C)
Aluminium	660	2520
Copper	1085	2562
Magnesium	650	1090
Iron	1538	2861
Zinc	420	907
Silver	962	2162

10) Metals have High Densities



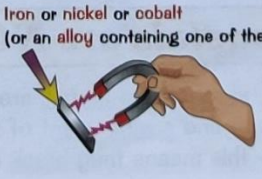
1) Density is all to do with how much stuff there is squeezed into a certain space.
2) Metals feel heavy for their size (i.e. they're very dense) because they have a lot of atoms tightly packed into a small volume.

11) Metals Make Alloys When Mixed with Other Metals



1) A combination of different metals is called an alloy. The properties of the metals get jumbled up in the new alloy.
2) So lighter, weaker metals can be mixed with heavier, stronger metals and the result is, hopefully, an alloy which is light and strong.

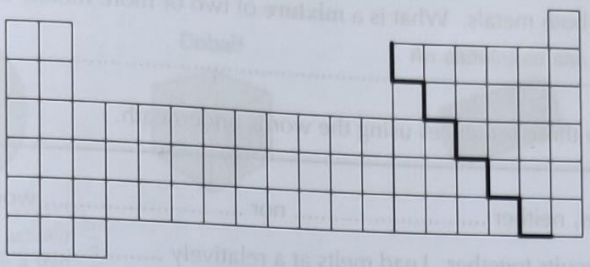
12) Some Metals are Magnetic



1) Only certain metals are magnetic.
2) Most metals aren't magnetic. Iron, nickel and cobalt are. Alloys made with these three metals will also be magnetic — e.g. steel is made mostly from iron, so is also magnetic.

Properties of Metals

Q1 Shade in the **periodic table** below to show where metals are found.



Q2 Saucepans are normally made out of metal because they are good conductors.

a) Briefly **describe** how energy is conducted through metals.

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b) Name **one** other property of metals that makes them suitable materials to make saucepans out of.

.....

c) Metals also conduct **electricity**.

i) What is an **electron**?

.....

ii) Explain why metals can conduct electricity.

.....

.....

iii) What is an **electric current**?

.....

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Homework

96

Properties of Metals

Q3 Solder is a mixture of **tin** and **lead**. Electricians heat small amounts of solder up until it **melts**, then use it like glue to stick two parts of a **circuit** together.

a) Tin and lead are both metals. What is a **mixture** of two or more metals called?

.....

b) Fill in the gaps in these sentences using the words underneath.

By themselves, neither ..... nor ..... would be very useful for joining circuits together. Lead melts at a relatively ..... temperature, but it's not very good at conducting ..... . On the other hand, tin is a ..... conductor of electricity, but it ..... easily be melted. When they're ..... together, the properties get mixed up, and you end up with an ..... that melts at a low temperature and conducts electricity.

alloy | electricity | mixed | tin | can't | good | low | lead

Q4 Explain why metals have each of these **properties**.

a) Metals are **strong** and **tough**.

.....

.....

b) Metals are **shiny**.

.....

.....

c) Metals have **high** melting and boiling points.

.....

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Properties of Metals

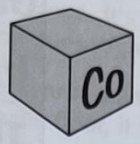
Q5 Draw a ring around all the objects that will be attracted to a magnet.

Steel is an alloy that contains iron

A 2p coin

'Bronze' coins are actually made of steel with a thin coating of copper.

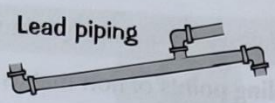
Cobalt



An aluminium can

Sir Galahad's suit of steel armour

Lead piping



Nickel

Q6 Rodrigo is making a sculpture by hammering metal into **thin sheets.**

a) Explain why metal can be shaped in this way without breaking.

.....

.....

b) Rodrigo then starts making wires by stretching out some more metal. What **property** of metals allow them to be stretched in this way?

.....

Q7 Musical instruments like bells and gongs are usually made out of metal.

a) Tick (✔) the sentence below that's correct and cross (✘) the one that's incorrect.

i) Metals are sonorous — they make a nice sound when you hit them. ☐

ii) Metals have low densities because they have lots of particles in a small space. ☐

b) Rewrite the sentence you put a cross next to so that's correct.

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