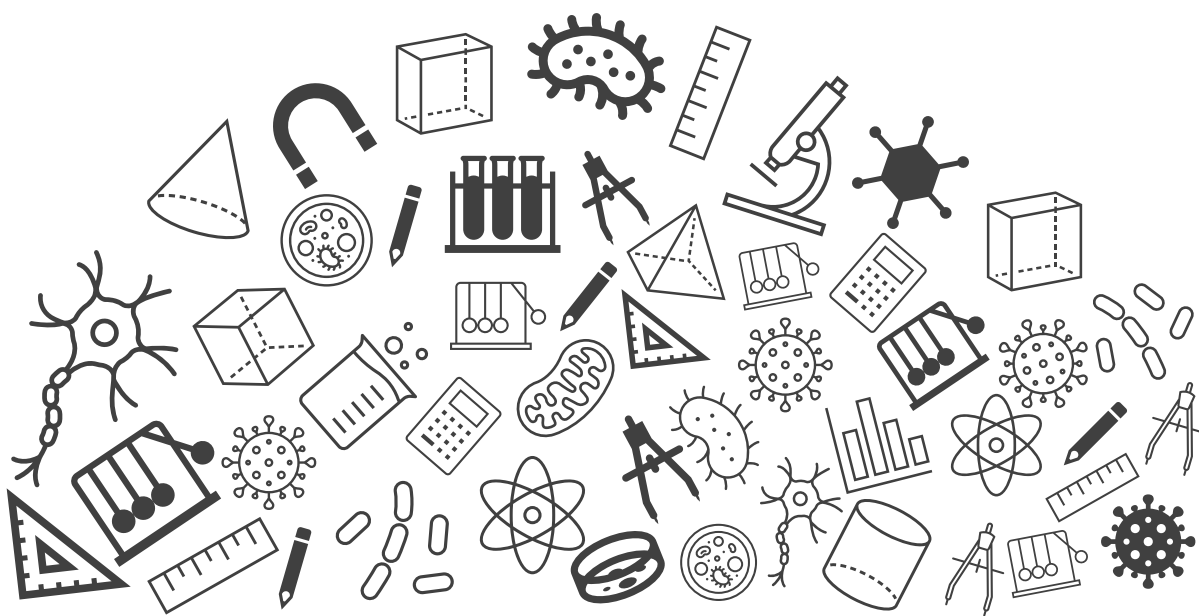




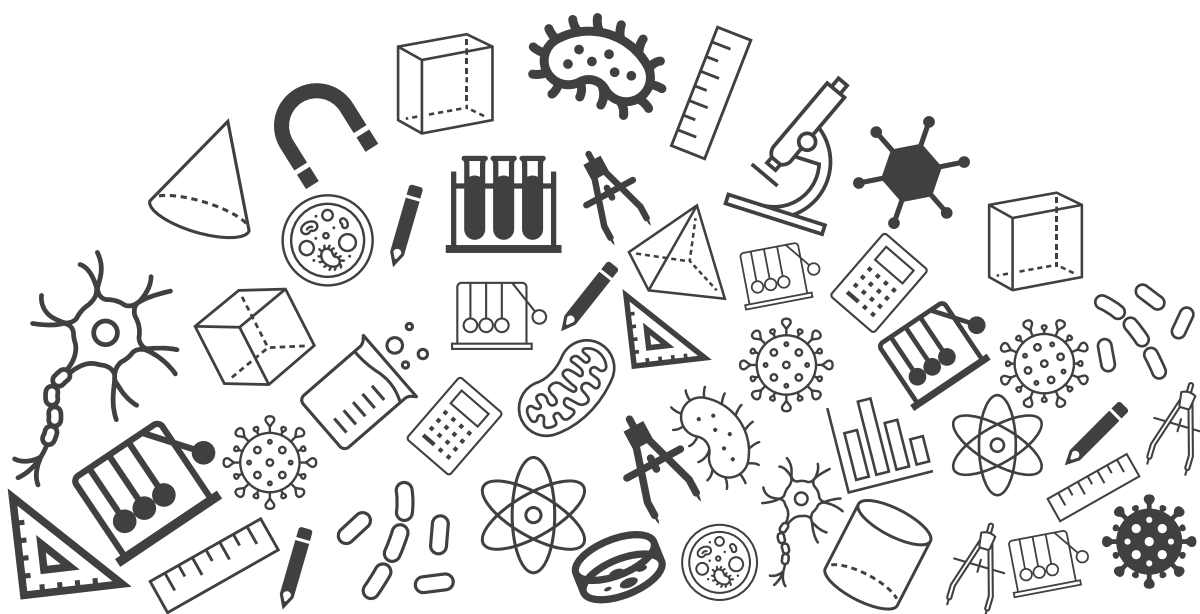
Grade 10: Science

Exam Important Questions





Metals and Non-Metals



Metals and Non-metals

Topic : Exam Important Questions

1. Assertion (A): Potassium cannot be used in making bells as they are non-sonorous.
Reason (R): Potassium is a metal.

Explain whether the given assertion(A) and the given reason(R) is true or not. If reason (R) is true explain whether it does the correct justification to the assertion(A).

[2 Marks]

Both (A) and (R) are correct but (R) is not the correct explanation of (A).

[1 Mark]

The materials that produce sound on striking are known as sonorous materials. Generally speaking, most of the metals exhibit the property of sonority but certain metals such as sodium and potassium do not show this property and are non-sonorous metals.

[1 Mark]

2. Statement (S): Both graphite and copper are good conductors of electricity yet only copper is used to make electric wires.

Reason (R): Copper is cheaper than graphite.

Explain whether the given statement (S) is true and the given reason (R) is the correct justification of the statement (S).

[2 Marks]

Both the statement (S) and reason (R) are also true.

[1 Mark]

Both graphite and copper are good conductors of electricity and copper in general is cheaper than graphite but the main reason behind usage of copper is the fact that copper is a metal and is hence ductile but graphite is a non-metal and is non-ductile. Hence a wire cannot be drawn from graphite.

[1 Mark]

Metals and Non-metals

3. Metal A burns in air, on heating, to form an oxide A_2O_3 whereas another metal B burns in air only on strong heating to form an oxide BO . The two oxides A_2O_3 and BO can react with hydrochloric acid as well as sodium hydroxide solution to form the corresponding salts and water.

- (a) What is the nature of oxide A_2O_3 ?
- (b) What is the nature of oxide BO ?
- (c) Name one metal like A.
- (d) Name one metal like B.

[3 Marks]

- (a) The oxide A_2O_3 is amphoteric, which can react with both acids and bases to form salt and water.

[0.5 Marks]

- (b) The oxide BO is amphoteric, which can react with both acids and bases to form salt and water.

[0.5 Marks]

- (c) Aluminium is a metal like A, which forms Al_2O_3 on reacting with oxygen.

[1 Mark]

- (d) Zinc is a metal like B which forms ZnO on strong heating in air(oxygen).

[1 Mark]

Metals and Non-metals

4. Write word equations and then balanced equations for the reactions taking place when
- (a) dilute sulphuric acid reacts with zinc granules.
 - (b) dilute hydrochloric acid reacts with magnesium ribbon.

[2 Marks]

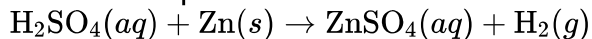
Solution:

(a) Word equation:

Sulphuric acid + Zinc \rightarrow Zinc sulphate + Hydrogen gas

[0.5 Marks]

Balanced equation:



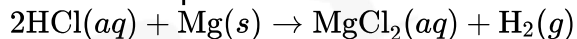
[0.5 Marks]

(b) Word equation:

Hydrochloric acid + Magnesium \rightarrow Magnesium chloride + Hydrogen gas

[0.5 Marks]

Balanced equation:



[0.5 Marks]

Metals and Non-metals

5. (a) Write the electron-dot structures for sodium, oxygen and magnesium.
(b) Show the formation of Na_2O and MgO by the transfer of electrons.

[3 + 2 = 5 Marks]

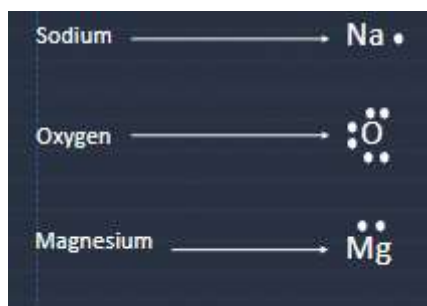
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Metals and Non-metals

(a)

Electron dot structure is the structure of an atom showing its valence shell electron by the dots around the atom.

Atom	Valence electrons
Sodium (Na)	1
Magnesium (Mg)	2
Oxygen (O)	6



[3 Marks]

(b)

Sodium atoms lose one electron to form Na^+ ions while oxygen atoms gain two electrons to form O^{2-} ions.

The two Na^+ ions combine to one O^{2-} ion to form Na_2O .

Formation of Na_2O .



[1 Mark]

Magnesium atoms lose two electrons to form Mg^{2+} ion while oxygen atoms gain two electrons to form O^{2-} ion.

The one Mg^{2+} ion combines to one O^{2-} ion to form MgO .



[1 Mark]

Metals and Non-metals

6. Explain the formation of the ionic compound magnesium chloride.

[3 Marks]

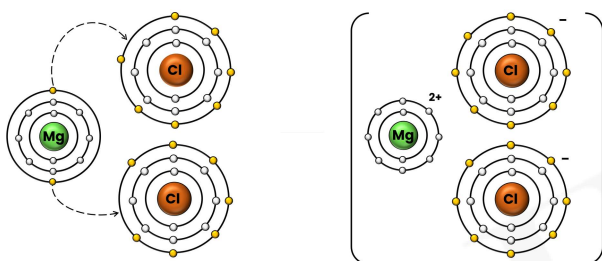
Magnesium is a metal with electronic configuration of 2, 8, 2 and it tends to lose its 2 outer-shell valence electrons to become a magnesium ion (2, 8).

[1 Mark]

The two electrons lost by the magnesium is gained by the two chlorine atoms (2, 8, 7) and thus produce magnesium ion and two chloride ions (2, 8, 8).

[1 Mark]

The oppositely charged magnesium and chloride ions attract each other and ionic bonds are formed.



[1 Mark]

7. How is aluminium extracted from alumina?

[1 Mark]

Aluminium is a highly reactive metal and it is placed in the upper region of the reactivity series. Aluminium is extracted by electrolytic reduction of its molten aluminium oxide.

[1 Mark]

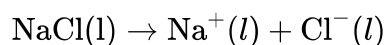
Metals and Non-metals

8. State the chemical reactions that take place during the electrolysis of sodium chloride.

[2 Marks]

Solution:

Sodium chloride is heated to obtain the molten salt. The molten salt forms the ions as follows:

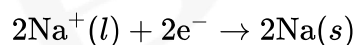


The negatively charged chloride ions are attracted towards the positive electrode, anode. The reaction that occurs at anode is:



[1 Mark]

The positively charged sodium ions move towards the negative electrode, cathode, and accept one electron each from the electrode and form the sodium metal. The reaction that occurs at the cathode is:



[1 Mark]