

C1 - Atomic Structure and Chemical Reactions Quiz

1. How do you work out the number of electrons, protons and neutrons in an atom?

The atomic number in the periodic table represents the number of protons which is equal to the number of electrons. Mass number – Atomic number = neutron number

2. Why are few objects made of pure metals?

Pure metals often are too expensive. In a pure metal the atoms are arranged in layers. The layers can slide easily which means that the metal bends too easily.

3. Why is there no overall charge on an atom?

Because the number of positive protons and negative electrons is equal in an atom.

4. Why do all atoms in the same group have similar chemical properties?

Because they all have the same number of electrons in their outer shell.

5. Why are all group 0 atoms unreactive?

Because they all have a full outer shell.

6. What are the differences in the atomic structure of hydrogen and helium atoms?

Hydrogen has one electron whereas helium has two electrons. Hydrogen has one proton and zero neutrons, helium has two protons and two neutrons.

7. How many electrons can you fit on each shell around the nucleus of an atom?

Two electrons on the first (inner shell), then eight on the second and third shell.

8. Describe the following reaction in terms of the names of the substances and the number of atoms involved: $2\text{Al} + 3\text{Cl}_2 \rightarrow 2\text{AlCl}_3$

Two aluminium atoms react with three chlorine molecules to form two aluminium chloride molecules.

9. State and explain the trend in reactivity down Group 1

The reactivity increases. This is because as you go down Group one, the size of the atom increases as there are more shells. The outer electron gets further away from the nucleus and is more shielded, it is lost more easily.

10. State and explain the trend in reactivity in group 7.

Reactivity down the group decreases. As you go down the group, the number of shells increases. This means that the outer shell is further from the nucleus and it is harder to attract another electron.

11. How do ions form?

Metal atoms lose their outer shell electrons forming positive ions. Non-metal atoms gain electrons forming negative ions. As a result metal atoms and non-metal atoms gain full outer shells.

12. What is a covalent bond?

A shared pair of electrons. Non-metal atoms share their electrons.

13. What is an ionic bond?

The electrostatic attraction between positive and negative ions. Formed when a metal reacts with a non-metal.

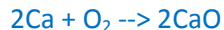
14. Why does Fe react with CuO but Cu does not react with FeO?

Because Fe is more reactive than Cu and can displace Cu from CuO. Cu is less reactive than Fe and cannot displace Fe from FeO.

15. What is produced when group 1 metals react with water?

Metal hydroxide + hydrogen. For example lithium + water \rightarrow lithium hydroxide + hydrogen

16. Balance this equation: $\text{Ca} + \text{O}_2 \rightarrow \text{CaO}$



17. Balance this equation: $\text{Al} + \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$



18. Balance this equation: $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$



19. Why must all equations be balanced?

Because you cannot create or destroy atoms.

20. Why is the total mass of reactants always equal to the total mass of products?

Because you cannot create or destroy atoms.

21. If 8.4g of MgCO_3 decompose on heating, what mass of MgO and what mass of CO_2 will be formed?

4g of MgO and 4.4g of CO_2 . The formula mass of MgCO_3 is 84, MgO is 48 and CO_2 is 44. Therefore 8.4 is 1/10th of 84, so 1/10th of product will be formed.