

CHEMISTRY – GRADE 10

SECTION A (30 MARKS)

1. Atomic Models

(a) Part labelled [+]: **Nucleus**

(b) Particle labelled e^- : **Electron**

(c) Feature of Rutherford's model:

The atom consists of a small, dense, positively charged nucleus surrounded by electrons orbiting at a distance (mostly empty space).

(d) Isotope:

Atoms of the same element with the same number of protons but different numbers of neutrons.

(e) Uses of isotopes:

- Carbon-14 dating
- Treatment of cancer (Cobalt-60)
- Detecting leaks in underground pipes

2.

(a) Identification:

i. Sodium hydroxide: **B (pH 14)**

ii. Pure water: **D (pH 7)**

iii. Tomato juice: **E (pH 4)**

iv. Hydrochloric acid: **C (pH 1)**

(b) Product of acid + metal:

Hydrogen gas and a salt

(c) Strong vs weak acids:

Strong acids fully ionize in water, while weak acids partially ionize.

3.

i. Nobel gas

ii. D_2SO_4

iii.

a. Y

b. E

iv. D and M

v. Element E reacts by gaining an electron thus increasing its radius due to the repulsion between electrons.

vi.

B			G		H	E	
	J		I	L		N	C
D						M	
Y							

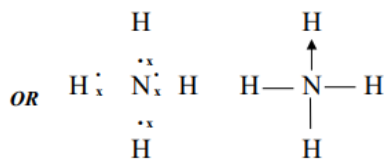
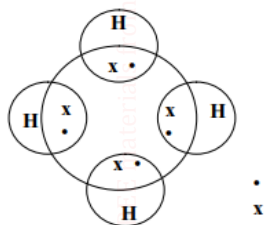
vii. I has a larger atomic radius than C because the atomic radius decreases across a period.

viii. 1st ionization energy increases from J to L due to increase in nuclear charge.

4.

(a) Ammonium ion (NH_4^+):

Nitrogen bonded to four hydrogens with one dative bond.



(b) Bond in NaCl: **Ionic (electrovalent)**

(c) Property of ionic compounds:

- High melting/boiling points
- Conduct electricity when molten or in solution

(d) Ionic vs covalent:

- Ionic: transfer of electrons
- Covalent: sharing of electrons

(e) Uses of metallic materials:

- Electrical wiring (copper)
- Construction (iron/steel)

SECTION B (50 MARKS)

5.

(a) Salt formed: **NaCl**

(b) Reaction type: **Neutralization**

(c) Types of salts:

- Normal salts
- Acid salts (or basic/double salts)

(d) Uses of salts:

- Food preservation
- Seasoning
- Soap manufacture

6.

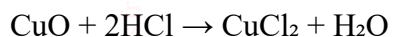
(a) Gas produced: **Hydrogen gas**

(b) Properties:

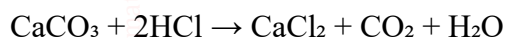
- Sour taste
- Turn blue litmus red
- $\text{pH} < 7$

(c) **Reactions:**

i. With metal oxide:



ii. With carbonate:



(d) Industrial uses:

- Fertilizer production
- Car batteries

7.

(a) Reactivity order: **P > R > Q**

(b) Melting point comparison:

Oxide of W has simple molecular structure while that of Z has giant ionic structure

8.

(a) Methods:

1. Acid + metal
2. Neutralization (acid + base)
3. Precipitation

(b) Behaviour in air:

- Deliquescence: absorbs moisture to form solution
- Efflorescence: loses water to atmosphere

(c) Uses:

- NaCl: cooking
- Ammonium nitrate: fertilizer

9.

(a) Electron configuration of Y: **2.8.6**

(b) Number of protons:

- P: **9**
- Y: **16**

(c) Formula: **P₂Y**

(d) Uses of sodium:

- Street lighting
- Nuclear reactor coolant

(e) Safety precautions:

- Handle with forceps
- Store under oil

10.

L:

- Structure: Giant Ionic
- Bonding: ionic/electrovalent

M:

- Structure: Giant metallic/covalent/atomic
- Bonding: Covalent

11.

(a)

i.



ii.



b. Nitrogen has a triple bond Fluorine has a single bond. Single bond is weaker than triple bond hence easier to break

12.

(a) Definition:

Weighted average mass of an atom compared to 1/12 of Carbon-12.

(b) Calculation:

$$\frac{(35 \times 75) + (37 \times 25)}{100} = 35.5$$

13.

(a) Uses:

- ✘ Medicine
- ✘ Agriculture
- ✘ Cleaning agents

(b) Environmental effects:

- ✘ Water pollution
- ✘ Global warming

(c) Safety:

- ✘ Wear PPE
- ✘ Ensure ventilation

14.

Ethanol is a covalent (molecular) compound and does not conduct electricity because it lacks free ions or delocalized electrons.

