

S.5 CHEMISTRY PANIC TEST – SCORING GUIDE

Item 1

a) Effect of radiation on Carbon-14 nucleus (3 marks)

- Beta decay occurs.
- A neutron changes into a proton and an electron.
- Atomic number increases from 6 to 7, forming Nitrogen-14.

b) Graph and half-life (5 marks)

- Correct axes and scale – 2
- Accurate plotting – 2
- Half-life $\approx$ 5700 years – 1

c) Dating an old bone (4 marks)

- Measure Carbon-14 remaining.
- Compare with living material.
- Determine number of half-lives elapsed.
- Calculate age of the bone.

d) Applications and health implications (3 marks)

Applications: cancer treatment, sterilization, tracers.

Health effects: mutations, burns, cancer, tissue damage.

Item 2

a) Molecular formulae (4 marks)

P: SiO₂

Q: H₂O

Correct working – 2 marks each.

b) Bonding and structures (3 marks)

P: Giant covalent structure.

Q: Simple molecular covalent.

R: Metallic structure.

c) Structure and uses (8 marks)

P: Insulator because no mobile electrons.

Q: Solvent due to polarity.

R: Conducts electricity because of delocalized electrons.

Award marks for correct structure-property explanations.

Item 3

a) Mass spectrometer description (8 marks)

- Vaporization
- Ionization
- Acceleration
- Deflection
- Detection

Award marks for labelled diagram and explanation.

b) Relative abundance and RAM (5 marks)

Total current = 0.16 + 2.72 + 2.50 + 5.92 = 11.30

Abundances:

204 = 1.42%

206 = 24.07%

207 = 22.12%

208 = 52.39%

Relative atomic mass ≈ 207.26

Metal identified: Lead (Pb).

c) Other uses of mass spectrometry (2 marks)

- Determining molecular masses.
- Identifying compounds and isotopes.