

CH 101: General Chemistry

Quiz 3 — Stoichiometry & Periodicity — ANSWER KEY

Duration: 30 minutes Maximum marks: 12

SET B

Instructions

- Write your name and roll number before starting.
- This paper has 6 questions in 3 parts, for a total of 12 marks.
- Answer Part C in your answer booklet, not on this paper.

Part A — Multiple Choice

6 marks

Q1. What is the oxidation state of manganese in KMnO_4 ?

[2 marks]

- (A) +2
(B) +7 ✓
(C) +4
(D) -1

Explanation. K is +1 and each O is -2: $1 + x - 8 = 0$, so $x = +7$.

Q2. Among the period-3 elements Na, Mg, Al and Si, which has the **largest** atomic radius?

[2 marks]

- (A) Na ✓
(B) Si
(C) Mg
(D) Al

Explanation. Radius decreases across a period as nuclear charge grows.

Q3. Which of the following are strong acids in water? (*Select all that apply.*)

[2 marks]

- (A) HCl ✓
(B) NH_3
(C) HNO_3 ✓
(D) CH_3COOH

Explanation. Acetic acid is weak; ammonia is a base.

Part B — Fill in the Blanks

3 marks

Q4. Balance: $\underline{2} \text{H}_2 + \text{O}_2 \rightarrow \underline{2} \text{H}_2\text{O}$.

[2 marks]

Q5. One mole contains $6.022 \times 10^{\underline{23}}$ elementary entities.

[1 mark]

Part C — Short Answer

3 marks

- Q6.** The Haber process $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is exothermic. Using Le Chatelier's principle, *[3 marks]* predict how (i) raising the temperature and (ii) raising the pressure each shift the equilibrium, with one-line reasons.

Model answer. (i) Heating shifts the equilibrium left — the reverse (endothermic) direction absorbs the added heat. (ii) Compression shifts it right, toward fewer moles of gas ($4 \rightarrow 2$), reducing pressure.

Rubric. +1.5 temperature: shifts left (heat is a product); +1.5 pressure: shifts right (4 gas moles $\rightarrow$ 2).

— *End of paper* —