



**Test Papers
Hub.**

AP Chemistry Practice Paper 1

Full Exam Simulation — Atomic Structure to Thermodynamics and Electrochemistry

Section I: 60 multiple-choice (A–D) · Section II: 3 long free-response (10 marks each) and 4 short free-response (4 marks each) · 106 marks in all · 195 minutes

How to use this booklet

- Working time – 195 minutes (Section I: 90 minutes; Section II: 105 minutes). A scientific or graphing calculator is permitted throughout.
- Section I has 60 multiple-choice questions with four options (A–D). Section II has 7 free-response questions — show all work and give units.
- An equations and constants sheet is provided at the back of the question paper. Use a periodic table to find atomic masses.
- Worked solutions follow the paper: every question has step-by-step working, a key takeaway and (for multiple choice) a note on why each wrong option is wrong.

SECTION I — MULTIPLE CHOICE

60 marks · 90 minutes · Attempt Questions 1 – 60

Choose the best answer for each question. Each question is worth 1 mark; there is no penalty for incorrect answers. A scientific or graphing calculator, the periodic table and the equations and constants sheet at the back are permitted.

1. A solution in a 2.00 cm cuvette has an absorbance of 0.500 at a wavelength where its molar absorptivity is $250 \text{ L}\cdot\text{mol}^{-1}\cdot\text{cm}^{-1}$. What is the concentration of the solution, in mol/L?

- A 0.00100
- B 250
- C 0.00200
- D 1000

2. In paper chromatography, a spot travels 1.8 cm while the solvent front travels 6.0 cm. What is the R_f value of the spot?

- A 10.8
- B 4.20
- C 0.300
- D 3.33

3. Among CH_4 , H_2S , HCl , H_2O , which has the lowest normal boiling point?

- A H_2O
- B CH_4
- C H_2S
- D HCl

4. Which species is a Lewis acid?

- A H_2O
- B NH_3
- C OH^-
- D BF_3

5. What is the formal charge on the N atom in NH_3 ?

- A +2
- B 0
- C +1
- D -1

6. A 25.0 mL sample of HNO_3 solution of unknown concentration is titrated to the equivalence point with 28.0 mL of 0.100 M NaOH. What is the concentration of the HNO_3 solution?

- A 0.100 M
- B 0.0893 M
- C 0.112 M
- D 2.80 M

7. Equal volumes of 0.0020 M Pb^{2+} and 1.0×10^{-4} M I^- are mixed. K_{sp} for PbI_2 is 7.1×10^{-9} . Does a precipitate form?

- A No: $Q = 2.5 \times 10^{-12}$ is less than K_{sp} .
- B Cannot be determined without the volumes.
- C Yes: $Q = 2.5 \times 10^{-12}$ is greater than K_{sp} .
- D No: the concentrations were not diluted, so $Q = 2.0 \times 10^{-11}$ is below K_{sp} .

8. The K_{a} of HClO is 3.0×10^{-8} . What is the K_{b} of its conjugate base at 25 °C?

- A 3.0×10^{-8}
- B 3.0×10^{-22}
- C 3.3×10^{-7}
- D 3.3×10^7

9. Which of the following correctly lists the substances in order of increasing boiling point?

- A $\text{CH}_3\text{OH} < \text{CH}_3\text{Cl} < \text{CH}_4$
- B $\text{CH}_4 < \text{CH}_3\text{OH} < \text{CH}_3\text{Cl}$
- C $\text{CH}_3\text{Cl} < \text{CH}_4 < \text{CH}_3\text{OH}$
- D $\text{CH}_4 < \text{CH}_3\text{Cl} < \text{CH}_3\text{OH}$

WORKED SOLUTIONS

Answers & worked solutions

Multiple-choice answer key

1	A	2	C	3	B	4	D	5	B	6	C
7	A	8	C	9	D	10	B	11	B	12	C
13	A	14	A	15	C	16	D	17	C	18	C
19	D	20	C	21	B	22	D	23	A	24	B
25	A	26	D	27	C	28	D	29	B	30	A
31	D	32	C	33	B	34	B	35	C	36	A
37	B	38	C	39	D	40	B	41	D	42	D
43	B	44	A	45	D	46	C	47	D	48	B
49	A	50	B	51	A	52	C	53	A	54	D
55	B	56	D	57	A	58	C	59	A	60	A

SECTION I — MULTIPLE CHOICE

1. A solution in a 2.00 cm cuvette has an absorbance of 0.500 at a wavelength where its molar absorptivity is $250 \text{ L} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$. What is the concentration of the solution, in mol/L?

[Beer–Lambert law]

Correct answer: A — 0.00100

- Beer–Lambert law: $A = \epsilon bc$, so $c = A \div (\epsilon b)$.
- $c = 0.500 \div (250 \times 2.00) = 0.00100 \text{ mol/L}$.
- Why the other options are wrong:
- B (250): The absorbance was multiplied by ϵ and b instead of divided
- C (0.00200): The path length was ignored
- D (1000): The ratio was inverted

LOS: Unit 3: Properties of substances and mixtures — Beer–Lambert law

KEY TAKEAWAY

Absorbance is proportional to concentration: dilute by 10 and the reading falls by 10 (same cuvette, same wavelength).