A-Level 化學 9701 Paper 1 選擇題操卷練習

A-Level（中六 / GCE A Level）　化學　|　時限：60 分鐘　|　總分：40 分　|　共 40 題

甲部：物理化學與無機化學（第 1 至 20 題，每題 1 分，共 20 分）

每題選出一個最正確的選項。

1. What amount of substance is present in 4.00 g of calcium carbonate (Mr = 100.0)?
A) 0.0400 mol B) 0.400 mol C) 4.00 mol D) 0.0200 mol（1 分）

2. What volume is occupied by 0.250 mol of an ideal gas at room temperature and pressure (molar volume 24.0 dm3)?
A) 3.00 dm3 B) 9.60 dm3 C) 24.0 dm3 D) 6.00 dm3（1 分）

3. 5.85 g of sodium chloride (Mr = 58.5) is dissolved to make 250 cm3 of solution. What is the concentration?
A) 0.400 mol dm-3 B) 0.100 mol dm-3 C) 0.0234 mol dm-3 D) 1.00 mol dm-3（1 分）

4. What is the pH of 0.010 mol dm-3 hydrochloric acid at 298 K?
A) 1.00 B) 12.00 C) 0.010 D) 2.00（1 分）

5. What is the pH of 0.010 mol dm-3 sodium hydroxide at 298 K (Kw = 1.00 x 10-14)?
A) 2.00 B) 7.00 C) 14.00 D) 12.00（1 分）

6. A weak monobasic acid has pH 3.00 in 0.100 mol dm-3 solution. What is Ka?
A) 1.0 x 10-5 mol dm-3 B) 1.0 x 10-3 mol dm-3 C) 1.0 x 10-7 mol dm-3 D) 1.0 x 10-1 mol dm-3（1 分）

7. Burning 0.0250 mol of a fuel raises the temperature of 50.0 g of water by 10.0 K (c = 4.18 J g-1 K-1). What is the enthalpy change of combustion per mole?
A) -2.09 kJ mol-1 B) -20.9 kJ mol-1 C) -83.6 kJ mol-1 D) -418 kJ mol-1（1 分）

8. 25.0 cm3 of 0.100 mol dm-3 NaOH is titrated with 0.200 mol dm-3 HCl. What volume of acid is required?
A) 12.5 cm3 B) 25.0 cm3 C) 50.0 cm3 D) 6.25 cm3（1 分）

9. The theoretical yield of a reaction is 0.200 mol and the actual yield is 0.160 mol. What is the percentage yield?
A) 20.0% B) 125% C) 160% D) 80.0%（1 分）

10. 1.60 g of a gas occupies 1.20 dm3 at room temperature and pressure (24.0 dm3 mol-1). What is its Mr?
A) 16.0 B) 64.0 C) 0.800 D) 32.0（1 分）

11. What amount of gas is present in 2.40 dm3 at room temperature and pressure (24.0 dm3 mol-1)?
A) 0.0100 mol B) 1.00 mol C) 0.100 mol D) 57.6 mol（1 分）

12. A gas sample has p = 1.00 x 105 Pa, V = 2.40 x 10-3 m3 and T = 298 K. What is n? (R = 8.31 J K-1 mol-1)
A) 0.969 mol B) 9.69 mol C) 0.0969 mol D) 0.00969 mol（1 分）

13. A radioisotope has a half-life of 6.0 hours. What mass remains from 8.0 g after 24 hours?

A) 2.0 g B) 1.0 g C) 0.50 g D) 0.25 g（1 分）

14. What is the oxidation number of chromium in the dichromate ion, Cr2O7 2-?

A) +7 B) +6 C) +3 D) +12（1 分）

15. What is the oxidation number of sulfur in sulfuric acid, H2SO4?

A) +4 B) +6 C) +2 D) -2（1 分）

16. What is the electron configuration of an iron atom (Z = 26)?

A) [Ar] 3d8 B) [Ar] 3d5 4s1 C) [Ar] 3d6 4s2 D) [Ar] 3d6 4s1 4p1（1 分）

17. How many moles of ions are produced when 1 mol of Al2(SO4)3 dissolves completely?

A) 2 mol B) 5 mol C) 3 mol D) 7 mol（1 分）

18. A compound contains 40.0% C, 6.7% H and 53.3% O by mass. What is its empirical formula?

A) C2H4O B) CH2O C) CHO D) C2H6O（1 分）

19. What is the atom economy of CaCO3 -> CaO + CO2? (Mr: CaCO3 = 100.1, CaO = 56.1)

A) 44.0% B) 100% C) 66.0% D) 56.0%（1 分）

20. What is the percentage by mass of nitrogen in ammonium nitrate, NH4NO3 (Mr = 80.0)?

A) 17.5% B) 28.0% C) 70.0% D) 35.0%（1 分）

乙部：有機化學與分析（第 21 至 40 題，每題 1 分，共 20 分）

每題選出一個最正確的選項。

21. 0.100 mol of zinc reacts completely with excess dilute hydrochloric acid. What volume of hydrogen is produced at r.t.p. (24.0 dm3 mol-1)?

A) 1.20 dm3 B) 2.40 dm3 C) 4.80 dm3 D) 24.0 dm3（1 分）

22. What mass of CuSO4.5H2O (Mr = 249.7) is needed for 0.0500 mol?

A) 12.5 g B) 6.24 g C) 25.0 g D) 1.25 g（1 分）

23. 25.0 cm3 of 0.400 mol dm-3 solution is diluted to 250 cm3. What is the new concentration?

A) 0.0400 mol dm-3 B) 0.400 mol dm-3 C) 0.00400 mol dm-3 D) 4.00 mol dm-3（1 分）

24. A buffer contains equal concentrations of a weak acid (pKa = 4.76) and its conjugate base. What is the pH?

A) 7.00 B) 9.24 C) 4.76 D) 2.38（1 分）

25. For H2 + I2 <=> 2HI, equilibrium concentrations are [H2] = 0.20, [I2] = 0.30 and [HI] = 0.60 mol dm-3. What is Kc?

A) 6.0 B) 0.167 C) 10.0 D) 1.0（1 分）

26. For a reaction with ΔH = +50.0 kJ mol-1 and ΔS = +100 J K-1 mol-1, what is ΔG at 500 K?

A) +100 kJ mol-1 B) -50.0 kJ mol-1 C) +50.0 kJ mol-1 D) 0.0 kJ mol-1（1 分）

27. E(Cu2+/Cu) = +0.34 V and E(Zn2+/Zn) = -0.76 V. What is Ecell for Zn + Cu2+ -> Zn2+ + Cu?

A) +0.42 V B) -1.10 V C) +1.10 V D) +0.34 V（1 分）

28. How much charge is needed to deposit 2.00 mol of copper from Cu2+? (F = 96 500 C mol-1)

A) 193 000 C B) 386 000 C C) 96 500 C D) 772 000 C（1 分）

29. A current of 0.500 A flows for 1930 s through copper(II) sulfate solution. What mass of copper is deposited? (Ar Cu = 63.5)

A) 0.635 g B) 0.318 g C) 0.159 g D) 1.27 g（1 分）

30. Doubling [A] doubles the initial rate, while doubling [B] has no effect. Which is the rate equation?

A) rate = k[A]2 B) rate = k[A][B] C) rate = k[B] D) rate = k[A]（1 分）

31. What are the units of the rate constant for rate = k[A][B] (overall second order)?

A) s-1 B) dm3 mol-1 s-1 C) mol dm-3 s-1 D) dm6 mol-2 s-1（1 分）

32. Why does a small rise in temperature greatly increase the rate of a reaction?

A) The activation energy falls sharply B) The concentration of reactants rises C) A larger proportion of molecules has energy greater than the activation energy. D) The molecules become smaller（1 分）

33. What is the bond angle in an ammonia molecule?

A) 107 degrees B) 109.5 degrees C) 120 degrees D) 90 degrees（1 分）

34. What is the shape of the SF6 molecule?

A) Tetrahedral B) Trigonal bipyramidal C) Octahedral D) Square planar（1 分）

35. What are the shape and bond angle of BF3?

A) Pyramidal, 107 degrees B) Tetrahedral, 109.5 degrees C) Trigonal planar, 120 degrees D) Linear, 180 degrees（1 分）

36. How many structural isomers have the molecular formula C4H10?

A) 1 B) 2 C) 3 D) 4（1 分）

37. How many non-cyclic structural isomers (ignoring cis-trans) have the formula C4H8?

A) 3 B) 2 C) 4 D) 5（1 分）

38. What is the major product when hydrogen bromide is added to propene?

A) 1-bromopropane B) 1,2-dibromopropane C) propan-2-ol D) 2-bromopropane（1 分）

39. Propan-1-ol is refluxed with excess acidified potassium dichromate(VI). What is the organic product?

A) Propanoic acid B) Propanal C) Propanone D) Propene（1 分）

40. Which reagent gives an orange precipitate with a carbonyl compound?

A) Tollens' reagent B) 2,4-dinitrophenylhydrazine C) Fehling's solution D) Bromine water（1 分）