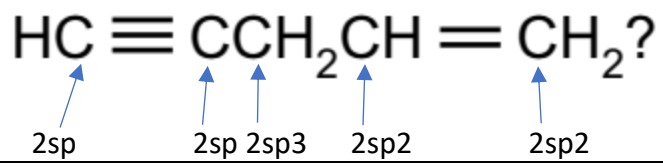
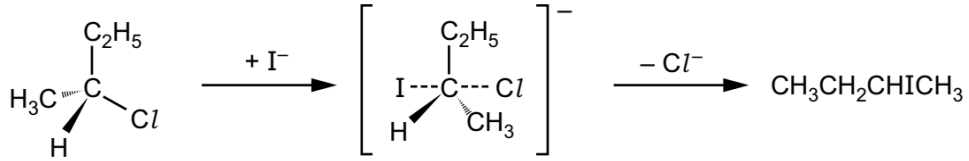
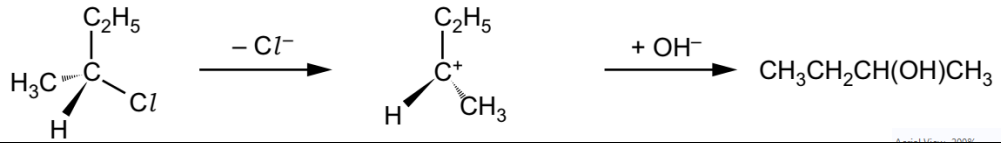
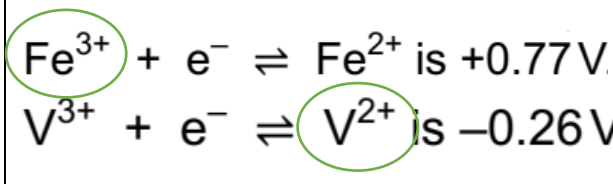
2026 H2 Chem Sample P1 Ans

1.	**Ans: D** F: $1s^2 2s^2 2p^5$ Ne: $1s^2 2s^2 2p^6$; neon has a smaller atomic radius than fluorine
2.	**Ans: D** After gaining an electron, P^+ → P: $[Ne]3s^2 3p^3$
3.	**Ans: C** 
4.	**Ans: B** Covalent molecules are polar H_2O is polar as molecule is bent C=O has pi bond that can be polarised by highly electronegative oxygen
5.	**Ans: D** Y, 13.3% → Ar of 1Y = 88.9; hence Mr = 668 Ba, 41.2% → Mr = 275 → p = 2 Cu, 28.7% → Mr = 191.8 → q = 3 O, 16.8% → Mr = 112.3 → r = 7
6.	**Ans: B** Atomic radius of P > S 1st IE of P > S (inter electronic repulsion forces of electrons in the same 3p orbitals) Oxidation state of P = +5 < oxidation state of sulfur = +6
7.	**Ans: C** $Ba^{2+} + 2e^- \rightleftharpoons Ba$: –2.90 $Br_2 + 2e^- \rightleftharpoons 2Br^-$: +1.07 $Ca^{2+} + 2e^- \rightleftharpoons Ca$: –2.87 **Reactivity Ba > Sr > Ca** **Most negative for Ba and least for Ca**
8.	**Ans: B** Changes in concentration of iodine, reaction rate (equivalent to gradient of conc I_2 vs time graph) is constant
9.	**Ans: B** C_6SH_{10} (Mr = 114) → 6 CO_2 (mass = 0.10/114 x 44 x 6) C_6SH_{10} (Mr = 114) → 1 SO_2 (vol = 0.10/114 x 24,000) C_6SH_{10} (Mr = 114) → 5 H_2O (mass = 0.10/114 x 18 x 5 = 0.079g) wrong C_6SH_{10} (Mr = 114) → $C_6SH_{10}Br_4$ (mass = 0.10/114 x (114+79.9x4))
10.	**Ans: A** $\Delta G^{\ominus} = +61 - (298K)x\text{-}30/1000 > 0$; wrong Insoluble since $\Delta G^{\ominus}$ is positive At higher temperature, $\Delta G^{\ominus}$ is more positive → salt is less soluble; wrong
11.	**Ans: A**

	Ea is lower and no change to the enthalpy NO_2 is an intermediate NOT transition state
12.	**Ans: D** rate = $k[P]^1[Q]^0[R]^2$ unit of rate is $moldm^{-3}s^{-1}$
13.	**Ans: D** **Difference in electronegativity between halogen and hydrogen <u>decreases</u> down the group.** **The bonding pair of electrons gets <u>further away from</u> the halogen nucleus going down the group.**
14.	**Ans: D** No surge in pH at endpoint and hence no indicator can meet the requirement of a titration endpoint
15.	**Ans: D** For buffer solution, Ka (benzoic acid) = 6×10^{-5} mol dm^{-3} = $\frac{[H^+][A^-]}{[HA]}$ = $[H^+] \times \frac{0.1}{0.01}$ = $[H^+] \times 10$
16.	**Ans: D** Similar question below. $\Delta G_1 = \Delta G_2$ → statement A is false as both have the same complex ions that are formed In this question the symbol '<' means 'less positive than' or 'more negative than'. Silver chloride dissolves in dilute $NH_3(aq)$ whereas silver bromide is only soluble in concentrated $NH_3(aq)$. The following equations represent the equilibria involved. $AgCl(s) \rightleftharpoons AgCl(aq)$ ΔG_1 $AgCl(aq) + 2NH_3(aq) \rightleftharpoons Ag(NH_3)_2Cl(aq)$ ΔG_2 $AgBr(s) \rightleftharpoons AgBr(aq)$ ΔG_3 $AgBr(aq) + 2NH_3(aq) \rightleftharpoons Ag(NH_3)_2Br(aq)$ ΔG_4 Some relationships between the free energies of these four reactions are as follows. 1 $(\Delta G_1 + \Delta G_2) < (\Delta G_3 + \Delta G_4)$ 2 $\Delta G_2 = \Delta G_4$ 3 $\Delta G_2 < \Delta G_4$ 4 $\Delta G_1 < \Delta G_3$ Which relationships are correct? A 1, 2 and 4 B 1 and 3 C 2 and 4 only D 3 only A $(\Delta G_1 + \Delta G_2) < (\Delta G_3 + \Delta G_4)$ and $\Delta G_1 < \Delta G_3$ are correct as dissolving AgCl in water or NH_3 should be more spontaneous than dissolving AgBr in water or NH_3. $\Delta G_2 = \Delta G_4$ is correct and $\Delta G_2 < \Delta G_4$ is incorrect as both reactions 2 and 4 are dependent on the same Ag^+ ion and NH_3 ligands, so the two reactions are equally spontaneous.
17.	**Ans: D** OH- is the nucleophile undertaking nucleophilic substitution with $C(CH_3)_3$ Br
18.	**Ans: B**

	Tripeptide has 2 CONH linkage & eliminates 2 x H_2O molecules (Mr = 18 x 2 = 36)
19.	**Ans: D** CN^- replaces Cl in a nucleophilic substitution
20.	**Ans: C** OH/COOH reacts with Na to produce hydrogen gas CHO/aldehyde to react with Tollens' reagent CH_2OH-CHO A contains 2xCHO B contains 2xCOOH D is saturated/ethanol
21.	**Ans: C** Presence of OH groups to form hydrogen bonding with water molecules
22.	**Ans: A** 4 3 2 1 Ester formed in option B: $CH_3CH_2CH(CH_3)CH_2O$-$COCH_3$ 2-methyl butyl ethanoate Reaction between alcohol and carboxylic acids are reversible.
23.	**Ans: B** B best explains why amide is a weaker base as lone pair electrons of N is less available for proton coordination.
24.	**Ans: C** $(C_2H_4O)n$ where n = 2, for carboxylic acid to be present $(C_2H_4O)_2$ is $C_4H_8O_2$ → C_3H_7COOH
25.	**Ans: C** **S_N2** When (+)-2-chlorobutane is warmed with NaI in propanone, (–)-2-iodobutane is produced.  transition state **S_N1** When (+)-2-chlorobutane is warmed with aqueous NaOH, racemic butan-2-ol is produced. 
26.	**Ans: B** Rate of hydrolysis: CO-Cl > C-Br > C-Cl > Arene-Cl
27.	**Ans: A**  Fe^{3+} + e⁻ ⇌ Fe^{2+} is +0.77 V V^{3+} + e⁻ ⇌ V^{2+} is –0.26 V, Fe^{3+} can oxidise V^{2+} or V^{2+} can reduce Fe^{3+}; Ecell > 0
28.	**Ans: C**

	Q = It = nF
29.	**Ans: C** Ecell = $E(Cu^{2+}/Cu) – E(Zn^{2+}/Zn)$ For Ecell to decrease, $[Cu^{2+}]$ decreases as OH- forces precipitation of $Cu(OH)_2$
30.	**Ans: A** Ammonia is a base and releases OH- to force the precipitation of iron(III) hydroxide $Fe^{3+} + 3OH^- \rightarrow Fe(OH)_3$