Retrieval Practice: Year 12 Number 23

Rules: Never look at your notes for retrieval practice! Do as many as you can, even if they are educated guesses. When you have tried (hard!) to answer them all, check the mark scheme and rate each question:

- Easy, remembered perfectly
- Harder – could remember part of it or was familiar when I saw the answer
- Very hard – didn't recognise the answer so need to go back over this

	Question	Rating
1	Explain why ethanoic acid has a higher boiling point than propanal	
2	Write a balanced half equation for the reduction of VO^{2+} to VO_2^+	
3	Write an equation, including state symbols, for the second ionisation energy of oxygen	
4	Calculate the enthalpy change of solution for calcium chloride in $kJmol^{-1}$, given that 11.1g of the solid added to $100cm^3$ water produced a temperature increase of 19.5°C	
5	Name the type of reaction and the major product formed when 2,5-dimethyl hex-2-ene reacts with HBr	
6	Write a balanced equation for the reaction between calcium hydroxide and nitric acid	
7	Write an ionic equation for the reaction between potassium chloride and fluorine	
8	Calculate the number of moles of nitrogen gas present in a sample with a volume of 100 cm^3 at a pressure of 200 kPa and a temperature of 50°C	
9	Give the reagents and conditions for producing propanal from propan-1-ol	
10	Determine the empirical formula for the oxide of vanadium that contains 56% vanadium	

Answers:

	Question	Rating
1	Explain why ethanoic acid has a higher boiling point than propanal • *Ethanoic has hydrogen bonding, strongest intermolecular force in propanal is permanent dipole attractions* • *Hydrogen bonding is stronger than permanent dipole attractions so requires more energy to overcome* *(the molecules have similar Mr so strength of London forces is similar)*	
2	Write a balanced half equation for the reduction of VO_2^+ to VO^{2+} $VO_2^+ + 2H^+ + e^- \rightarrow + VO^{2+} H_2O$	
3	Write an equation, including state symbols, for the second ionisation energy of oxygen $O^+ (g) \rightarrow O^{2+} (g) + e^-$	
4	Calculate the enthalpy change of solution for calcium chloride in $kJmol^{-1}$, given that 11.1g of the solid added to $100cm^3$ water produced a temperature increase of 19.5°C *Moles $CaCl_2$ = 11.1/111.1 = 0.1 mol* *Energy transferred = 100 x 4.18 x 19.5 = 8151 J = 8.151 kJ* *Enthalpy change = - 8.151/0.1 = - 81.51 $kJmol^{-1}$*	
5	Name the type of reaction and the major product formed when 2,5-dimethyl hex-2-ene reacts with HBr *Electrophilic addition* *2-bromo-2,5-dimethylhexane*	
6	Write a balanced equation for the reaction between calcium hydroxide and nitric acid $Ca(OH)_2 + 2HNO_3 \rightarrow Ca(NO_3)_2 + 2H_2O$	
7	Write an ionic equation for the reaction between potassium chloride and fluorine $2Cl^- + F_2 \rightarrow Cl_2 + 2F^-$	
8	Calculate the number of moles of nitrogen gas present in a sample with a volume of 100 cm^3 at a pressure of 200 kPa and a temperature of 50°C *n = PV/RT* *P = 200000 Pa V = 1 x 10^{-4} m^3 T = 323 K R = 8.31* *n = 7.45 x 10^{-3} mol*	
9	Give the reagents and conditions for producing propanal from propan-1-ol *Acidified potassium dichromate* *Heat and distil the mixture*	
10	Determine the empirical formula for the oxide of vanadium that contains 56% vanadium *V O* *% 56 44* *Mol 1.100 2.75* *Ratio 1 2.5* *2 : 5 Formula: V_2O_5*