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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	Write a balanced half equation for the reduction of dichromate (VI) ($\text{Cr}_2\text{O}_7^{2-}$) to Cr^{3+}	  
2	Write a balanced equation for the cracking of decane into butane and two molecules of an alkene	  
3	Draw the E and Z isomers of 2-chlorobut-2-ene	  
4	Explain why aluminium has a lower first ionisation energy than magnesium	  
5	Write an equation for the reaction between calcium oxide and hydrochloric acid	  
6	Draw and name the shape of PCl_5 and give the bond angles present in this molecule	  
7	Calculate the volume, in cm^3 , of 140 grams of nitrogen gas at 200 kPa and 35°C ($R = 8.31 \text{ Jmol}^{-1}\text{K}^{-1}$)	  
8	Define isotope	  
9	Calculate the enthalpy change of combustion, in kJmol^{-1} , if 0.40 grams methanol raises the temperature of 100 cm^3 water from 21°C to 39°C	  
10	Draw the skeletal formula of 2-chloro pent-1,3-diene	  

Answers:

	Question	Rating
1	Write a balanced half equation for the reduction of dichromate (VI) ($\text{Cr}_2\text{O}_7^{2-}$) to Cr^{3+} $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$	  
2	Write a balanced equation for the cracking of decane into butane and two molecules of an alkene $\text{C}_{10}\text{H}_{22} \rightarrow \text{C}_4\text{H}_{10} + 2\text{C}_3\text{H}_6$	  
3	Draw the E and Z isomers of 2-chlorobut-2-ene <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> $\begin{array}{c} \text{H}_3\text{C} \quad \text{CH}_3 \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{Cl} \quad \text{H} \end{array}$ E </div> <div style="text-align: center;"> $\begin{array}{c} \text{H}_3\text{C} \quad \text{H} \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{Cl} \quad \text{CH}_3 \end{array}$ Z </div> </div>	  
4	Explain why aluminium has a lower first ionisation energy than magnesium <ul style="list-style-type: none"> • <i>Electron removed from aluminium is in 3p; electron removed from magnesium is in 3s</i> • <i>3p is higher in energy so less energy is required to remove the electron</i> 	  
5	Write an equation for the reaction between calcium oxide and hydrochloric acid $\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$	  
6	Draw and name the shape of PCl_5 and give the bond angles present in this molecule <i>Trigonal bipyramidal, 90 and 120</i>	   
7	Calculate the volume, in cm^3 , of 140 grams of nitrogen gas at 200 kPa and 35°C ($R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$) <i>Moles = $140/28 = 5$</i> <i>*Be careful - the formula of nitrogen is N_2!</i> <i>$PV = nRT$ so $V = nRT/P$</i> <i>V (in m^3) = $5 \times 8.31 \times (273+35) / 200\,000$</i> <i>$V = 0.0640 \text{ m}^3$</i> <i>$V$ in $\text{cm}^3 = 0.0640 \times 1\,000\,000 = 63\,400 \text{ cm}^3$</i>	  
8	Define isotope <ul style="list-style-type: none"> • <i>Atoms with the same atomic number/number of protons</i> • <i>And different mass number/number of neutrons</i> 	  
9	Calculate the enthalpy change of combustion, in kJ mol^{-1} , if 0.40 grams methanol raises the temperature of 100 cm^3 water from 21°C to 39°C <i>Temperature change = 18</i> <i>Energy released = $100 \times 4.18 \times 18 = 7524 \text{ J} = 7.524 \text{ kJ}$</i> <i>Mol = $0.4 / 32 = 0.0125$</i> <i>Enthalpy change = $7.524 / 0.0125 = -602 \text{ kJ mol}^{-1}$</i>	  
10	 Draw the skeletal formula of 2-chloropent-1,3-diene	