























































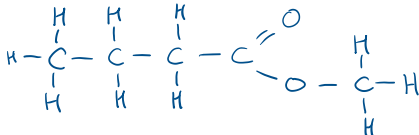






Retrieval Practice: Year 13 number 17

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	Calculate the mass of Na_2CO_3 needed to completely neutralise 25 cm^3 1.0 mol dm^{-3} HNO_3	  
2	Define first ionisation energy	  
3	Write a half equation for the reaction of dichromate (VI) ions ($\text{Cr}_2\text{O}_7^{2-}$) to form Cr^{3+} ions and explain whether it is oxidation or reduction	  
4	Give two observations you would make when solid magnesium carbonate is added to hydrochloric acid	  
5	Give the number of protons, electrons and neutrons in $^{25}\text{Mg}^{2+}$	  
6	Calculate the pH of a 0.15 mol dm^{-3} solution of NaOH ($K_w = 1.0 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-3}$)	  
7	Define nucleophile and give examples of three species that could act as nucleophiles	  
8	Draw the displayed formula of methyl butanoate	  
9	Write a balanced equation for the reaction between benzene and chlorine and give the formula of the catalyst required	  
10	Calculate the mass of oxygen gas that occupies 300 cm^3 at 100 kPa and 45°C	  

Answers:

	Question	Rating
1	<p>Calculate the mass of Na_2CO_3 needed to completely neutralise 25 cm^3 1.0 mol dm^{-3} HNO_3</p> <p><i>Moles $\text{HNO}_3 = 1 \times 25 / 1000 = 0.025 \text{ mol}$</i> <i>Moles $\text{Na}_2\text{CO}_3 = 0.025 / 2 = 0.0125$ $M_r = 106$</i> <i>Mass = $0.0125 \times 106 = 1.325 \text{ g}$</i></p>	  
2	<p>Define first ionisation energy</p> <p><i>The energy required to remove the outer electron from each atom in a mole of gaseous atoms</i></p>	  
3	<p>Write a half equation for the reaction of dichromate (VI) ions ($\text{Cr}_2\text{O}_7^{2-}$) to form Cr^{3+} ions and explain whether it is oxidation or reduction</p> <p><i>$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$</i> <i>reduction - gain of electrons as chromium goes from +6 to +3</i></p>	  
4	<p>Give two observations you would make when solid magnesium carbonate is added to hydrochloric acid</p> <ul style="list-style-type: none"> <i>Solid disappears</i> <i>Fizzing/bubbles/effervescence</i> 	  
5	<p>Give the number of protons, electrons and neutrons in $^{25}\text{Mg}^{2+}$</p> <p><i>12 protons, 10 electrons, 13 neutrons</i></p>	  
6	<p>Calculate the pH of a 0.15 mol dm^{-3} solution of NaOH ($K_w = 1.0 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-3}$)</p> <p><i>$[\text{H}^+] = 1.0 \times 10^{-14} / 0.15 = 6.66 \times 10^{-14}$</i> <i>$\text{pH} = 13.18$</i></p>	  
7	<p>Define nucleophile and give examples of three species that could act as nucleophiles</p> <p><i>Donates a lone pair of electrons to a δ^+ carbon atom</i> <i>Examples: ammonia, amines, water, hydroxide ion, cyanide ion, halide ions</i></p>	  
8	<p>Draw the displayed formula of methyl butanoate</p> 	  
9	<p>Write a balanced equation for the reaction between benzene and chlorine and give the formula of the catalyst required</p> <p><i>$\text{C}_6\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_6\text{H}_5\text{Cl} + \text{HCl}$</i> <i>Catalyst = AlCl_3</i></p>	  
10	<p>Calculate the mass of oxygen gas that occupies 300 cm^3 at 100 kPa and 45°C</p> <p><i>$n = PV / RT$</i> <i>$n = (100000 \times 300 \times 10^{-6}) / (8.31 \times 318) = 0.01135$</i> <i>Mass = $0.01135 \times 32 = 0.36 \text{ g}$</i></p>	