

WAKISSHA JOINT MOCK EXAMINATIONS  
MARKING GUIDE  
Uganda Advanced Certificate of Education  
UACE August 2023  
CHEMISTRY P525/1



1. (a)	${}^{24}_{11}\text{Na} \longrightarrow {}^{24}_{12}\text{Mg} + {}^0_{-1}\text{e} + 2\gamma$	✓ 01
(b)	$\lambda = \frac{\ln 2}{t_{1/2}}$ $\lambda = \frac{\ln 2}{15} = 0.046209812 \text{ per hour}$ $\ln\left(\frac{N_0}{N_t}\right) = \lambda t$ $\ln\left(\frac{2.4}{N_t}\right) = 0.046209812 \times 72$ $N_t = 0.086152\text{g}$ $\text{Mass decayed} = 24 - 0.086152$ $= 23.913848\text{g}$	04
(c)	Carbon dating using carbon - 14 Cobalt-60 gamma radiation for cancer treatment (any 2 correct)	01
2. (a) (i)	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$	06 marks
(ii)	$\text{CrO}$ , $\text{Cr}_2\text{O}_3$ and $\text{CrO}_3$	01
(b) (i)	$\text{CrO}_{(s)} + 2\text{H}^+_{(aq)} \longrightarrow \text{Cr}^{2+}_{(aq)} + \text{H}_2\text{O}_{(l)}$	1½
(ii)	$\text{CrO}_{3(s)} + 2\text{OH}^-_{(aq)} \longrightarrow \text{CrO}_4^{2-}_{(aq)} + \text{H}_2\text{O}_{(l)}$	1½
3(a)	$\text{CH}_3\text{CH}_2\text{Br} \xrightarrow[\text{Heat}]{\text{CH}_3\text{CH}_2\text{ONa}^+ / \text{alcohol}} \text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ Mechanism: $\text{CH}_3\text{CH}_2\text{ONa}^+ \longrightarrow \text{CH}_3\text{CH}_2\text{O}^- + \text{Na}^+$ $\text{CH}_3\text{CH}_2\text{O}^- + \text{CH}_3\text{CH}_2\text{Br} \longrightarrow \text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3 + \text{Br}^-$ $\text{Cyclohexyl-Br} + \text{HBr} \longrightarrow \text{Cyclohexyl-Br} + \text{HBr}$	5½ marks
(b)	$\text{Cyclohexyl-Br} + \text{Br}^- \longrightarrow \text{Cyclohexyl-Br} + \text{Br}^-$ $\text{Cyclohexyl-Br} + \text{Br}^- \longrightarrow \text{Cyclohexyl-Br} + \text{Br}^-$	03
		06 marks

4(a)	The precipitation of a sparingly soluble ionic compound from its saturated solution at <u>constant temperature</u> by adding a solution containing a strong electrolyte with similar ions. <i>Accept; more soluble salt</i>	01
(b) (i)	<p>R.F.M of <math>\text{PbCl}_2 = 277.8</math></p> <p>Solubility in <math>\text{CaCl}_2 = 2.951625 / 277.8</math>  <math>= 0.010625 \text{ mol dm}^{-3}</math></p> <p><math>[\text{Cl}^-] = 2 \times 0.02 + 0.010625 \times 2</math>  <math>= 0.06125 \text{ mol dm}^{-3}</math></p> <p><math>\text{PbCl}_{2(s)} + \text{aq} \rightleftharpoons \text{Pb}^{2+}_{(aq)} + 2\text{Cl}^{-}_{(aq)}</math></p> <p><math>K_{sp} = [\text{Pb}^{2+}][\text{Cl}^-]^2</math>  <math>= 0.010625 \times 0.06125^2 = 3.98604 \times 10^{-5} \text{ mol}^3 \text{ dm}^{-9}</math></p> <p>Let solubility in pure water be <math>x</math>.  <math>K_{sp} = 4x^3</math>  <math>4x^3 = 3.98604 \times 10^{-5}</math></p> <p><math>x = \left( \frac{1}{4} \times 3.98604 \times 10^{-5} \right)^{1/3}</math>  <math>= 0.02152 \text{ mol}^3 \text{ dm}^{-9}</math></p> <p>Solubility <math>= 0.02125 \times 277.8</math>  <math>= 5.90325 \text{ g dm}^{-3}</math></p> <p><i>Accept <math>[\text{Cl}^-] = 2 \times 0.02 = 0.04 \text{ M}</math></i>  <math>K_{sp} = 1.696 \times 10^{-5} \text{ mol}^3 \text{ dm}^{-9}</math>  <math>4x^3 = 1.696 \times 10^{-5}</math>  <math>x = \left( \frac{1.696 \times 10^{-5}}{4} \right)^{1/3}</math>  <i>solubility</i>  <math>= 4.50198 \text{ g dm}^{-3}</math></p>	05
(ii)	Lead (II) chloride is less soluble in calcium chloride than in pure water. <i>Award if b(ii) is correct.</i>	$\frac{1}{2}$
		6½ marks
5(a)	<p><math>\text{MgCl}_{2(aq)} + \text{H}_2\text{O}_{(l)} \longrightarrow \text{MgO}_{(s)} + 2\text{HCl}_{(aq)}</math> 146.2</p> <p><math>\text{Mg}_{(s)} + 2\text{HCl}_{(aq)} \longrightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)}</math> -478.4</p> <p><math>\text{H}_{2(g)} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \text{H}_2\text{O}_{(l)}</math> <math>\frac{1}{2} \times -572</math></p> <p><math>\text{Mg}_{(s)} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \text{MgO}_{(s)}</math> <math>\Delta H_f = -618.2 \text{ kJ mol}^{-1}</math></p>	03
(b)	<p>Magnesium is stable (relative to its elements) <i>Rej; if (a) is wrong.</i></p> <p>Reason – Negative enthalpy of formation. <i>Acc. Enthalpy of formation is exothermic</i></p>	$1\frac{1}{2}$
		4½ marks
6(a)	Fluorine is <u>more electronegative</u> than Iodine thus hydrogen fluoride molecules are held by strong <u>intermolecular hydrogen bonds</u> while hydrogen iodide molecules are held by <u>weak vander waals forces</u> which require <u>less heat energy</u> to break.	02
(b)(i)	<p>Both HF and HI react with sodium carbonate solution to form corresponding sodium salts, carbon dioxide gas and water.</p> <p><math>2\text{HF}_{(l)} + \text{Na}_2\text{CO}_{3(aq)} \longrightarrow 2\text{NaF}_{(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)}</math></p> <p><math>2\text{HI}_{(g)} + \text{Na}_2\text{CO}_{3(aq)} \longrightarrow 2\text{NaI}_{(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)}</math></p> <p>Accept general equation</p> <p><math>2\text{Hx} + \text{Na}_2\text{CO}_{3(aq)} \longrightarrow 2\text{NaX}_{(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)}</math></p>	$1\frac{1}{2}$



(ii)	<p>HF does not react with Conc. <math>\text{H}_2\text{SO}_4</math>.</p> <p>HI reduces concentrated Sulphuric acid to Sulphur dioxide and water, itself oxidized to Iodine.</p> <p><math>2\text{HI} + \text{H}_2\text{SO}_4(l) \longrightarrow \text{SO}_{2(g)} + \text{I}_{2(g)} + 2\text{H}_2\text{O}(l)</math></p> <p>OR <math>8\text{HI} + \text{H}_2\text{SO}_4(l) \longrightarrow \text{H}_2\text{S}(g) + 4\text{H}_2\text{O} + 4\text{I}_2(g)</math></p>	1½
7. (a)	<p> </p> <p>Both products must be written.</p>	05marks
(b)	<p>Sodium carbonate solution <i>Acc. sodium hydrogen carbonate solution</i></p> <p>Observations <i>Rej all marks, if solution is not there</i></p> <p> </p> <p>- Bubbles of a colorless gas</p> <p><math>\text{CH}_3\text{OH}</math> - No observable change</p>	01
(c)	Solvent extraction	02
8. (a)	<p><i>Rej all marks for anomalous expansion</i></p> <p>Phases - 1½</p> <p>Axes - 01</p> <p>Shape - ½ (position of triple point and critical point)</p>	4½marks
(b) (i)	Solid E melts into liquid which on further heating is converted into vapour	03
(ii)	All Liquid E and gaseous E (vapour) solidifies.	01
9. (a) (i)	hexachloroplumbate (IV) ions <i>Acc. hexachloroplumbic (IV) acid</i>	01
(ii)	Ammonium hexachloro plumbate (IV)	05marks
(iii)	Lead (IV) chloride <i>Accept Lead tetrachloride</i>	½
(b)	$\text{PbCl}_4(l) + 2\text{H}_2\text{O}(l) \longrightarrow \text{PbO}_{2(s)} + 4\text{HCl}(g)$ <i>Accept (aq) for HCl</i>	½
(c)	Hydrolysis	01
		½
		03marks

# SECTION B (54MARKS)

10(a)	<p> <chem>c1ccccc1C(=O)O</chem> to <chem>c1ccccc1C(=O)Cl</chem>  <chem>c1ccccc1C(=O)O</chem> <math>\xrightarrow[\text{Heat}]{\text{NaOH(aq)/CaO}} <chem>c1ccccc1</chem> <math>\xrightarrow{\text{CH}_3\text{Cl}/\text{AlCl}_3} <chem>c1ccccc1C</chem> <math>\xrightarrow{\text{Cl}_2/\text{AlCl}_3} <chem>c1ccccc1C(Cl)C</chem> <math>\xrightarrow[\text{Heat}]{\text{KMnO}_4/\text{H}^+} <chem>c1ccccc1C(=O)Cl</chem>  <i>Acc. sodalime</i> </math></math></math></math></p>	3½
(b)	<p> <chem>CH_3Br</chem> to <chem>(CH_3)_2N-N=O</chem>  <chem>CH_3Br</chem> <math>\xrightarrow[\text{Heat in a sealed tube}]{\text{Conc. NH}_3} <chem>CH_3NH_2</chem> <math>\xrightarrow{\text{CH}_3Br} <chem>(CH_3)_2NH</chem> <math>\xrightarrow[0^\circ\text{C}]{\text{NaNO}_2(\text{aq})/\text{Conc. HCl}} <chem>(CH_3)_2N-N=O</chem>  <i>Rej: HNO<sub>2</sub></i> </math></math></math></p>	3½
(c)	<p> <chem>c1ccccc1[N+]#N.[Cl-]</chem> <math>\xrightarrow[\text{Or: (1. SnCl}_2/\text{Conc. HCl), (2. NaOH(aq))}]{\text{Na}_2\text{SO}_3(\text{aq})} <chem>c1ccccc1NHNH_2</chem> <math>\xrightarrow{\text{HCHO}/\text{H}^+} <chem>c1ccccc1NHN=CH_2</chem> </math></math></p>	02
		09marks
11.(a)(i)	Copper (II) sulphate is a strong electrolyte which fully dissociates to produce high concentration of copper (II) ions and sulphate ions.	01 <i>Rej: ionise</i>
(ii)	Excess ammonia is a weak base / alkali which only partially ionizes to produce few ions.	01
(b)(i)	$\text{Cu}^{2+}_{(\text{aq})} + 2\text{OH}^{-}_{(\text{aq})} \longrightarrow \text{Cu}(\text{OH})_{2(\text{s})}$	01 <i>Deny all if (s) is not there</i>
(ii)	$\text{Cu}(\text{OH})_{2(\text{s})} + 4\text{NH}_{3(\text{aq})} \longrightarrow [\text{Cu}(\text{NH}_3)_4]^{2+}_{(\text{aq})} + 2\text{OH}^{-}_{(\text{aq})}$	01
(c) (i)	<p> Molar conductivity of water = <math>\frac{k}{c}</math>  <math>= \frac{5.484 \times 10^{-8}}{1/18}</math>  <math>= 9.8712 \times 10^{-7} \Omega^{-1}\text{cm}^2\text{mol}^{-1}</math>  At infinite dilution, <math>\Lambda_0(\text{H}_2\text{O}) = \Lambda_0(\text{H}^+) + \Lambda_0(\text{OH}^-)</math>  <math>= 349.8 + 198.6</math>  <math>= 548.4 \Omega^{-1}\text{cm}^2\text{mol}^{-1}</math>  <i>Accept; correct alternative calculation.</i> </p>	3½



	$\alpha = \frac{\Lambda_c}{\Lambda_o}$ $= 9.8712 \times 10^{-7} / 548.4$ $= 1.80 \times 10^{-9}$	
(ii)	$K_w = [H^+][OH^-]$ or $K_w = C^2 \alpha^2$ $= \left(\frac{1000}{18}\right)^2 \times (1.80 \times 10^{-9})^2$ $\approx 1.0 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}$	1 1/2
		09marks
12.(a) (i)	Due to the presence of lone pairs of electrons on the oxygen atom, the hydroxyl group of phenol has a positive inductive effect which increases the electron density of the benzene ring thus phenol is more reactive towards electrophilic substitution than benzene.	02
(ii)	2-nitrophenol is volatile and immiscible with water since its molecules are held by weak van der Waals forces while 4-nitrophenol is relatively non-volatile due to strong intermolecular hydrogen bonds. 2-nitrophenol has a fairly high relative formula mass.	02
(b)	Vapour pressure of 2-nitrophenol = $1.0 - 0.825 = 0.175 \text{ atm}$ . $\frac{\text{V.P of water}}{\text{V.P of 2 nitrophenol}} = \frac{\text{mass of water} \times \text{R.F.M of 2-nitrophenol}}{\text{mass of 2-nitrophenol} \times \text{R.F.M of water}}$ $\frac{0.825}{0.175} = \frac{0.9 \times 139}{m \times 18}$ $M = \frac{0.9 \times 139 \times 0.175}{0.825 \times 18}$ $M = 1.30455 \text{ g}$	03
(c)	- compounds distil below their boiling points hence saves energy. - enables purification of compounds (organic) which decompose near their boiling points.	02
		9marks
13.(a)(i)	Barium nitrate solution followed by dilute nitric acid / Ammonium molybdate and conc. $\text{HNO}_3$ . $\text{K}_2\text{SO}_4(\text{aq})$ - White precipitate insoluble in nitric acid. $\text{K}_3\text{PO}_4(\text{aq})$ - White precipitate soluble in nitric acid.	02
(ii)	Silver nitrate solution followed by dilute nitric acid / calcium nitrate solution $\text{NaCl}(\text{aq})$ - White precipitate insoluble in nitric acid $\text{Na}_2\text{C}_2\text{O}_4(\text{aq})$ - White precipitate soluble in nitric acid	02
(b)(i)	Dichromate ions react with sodium hydroxide to form chromate (VI) ions which form sparingly soluble lead(II) chromate on addition of lead(II) nitrate. $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 2\text{OH}^-(\text{aq}) \longrightarrow 2\text{CrO}_4^{2-}(\text{aq}) + \text{H}_2\text{O}(\text{l})$ $\text{Pb}^{2+}(\text{aq}) + \text{CrO}_4^{2-}(\text{aq}) \longrightarrow \text{PbCrO}_4(\text{s})$	2 1/2

(ii)	Manganese (II) ions are oxidized to Manganate (VII) ions which is purple and the bismuthate is reduced to bismuth (III) ions. $2\text{Mn}^{2+}_{(\text{aq})} + 5\text{BiO}_3^- + 14\text{H}^+_{(\text{aq})} \longrightarrow 2\text{MnO}_4^-_{(\text{aq})} + 5\text{Bi}^{3+}_{(\text{aq})} + 7\text{H}_2\text{O}_{(\text{l})}$	9marks
14 (a)(i)	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO}$	01
(ii)	3-hydroxybutanal	01
(b)(i)	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO} \xrightarrow{\text{ZnCl}_2(\text{s}) / \text{conc. HCl}} \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{CHO}$	01
(ii)	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO} + 2\text{Ag}^+_{(\text{aq})} + 2\text{NH}_3_{(\text{aq})} + \text{H}_2\text{O}_{(\text{l})} \longrightarrow \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{COOH} + 2\text{Ag}_{(\text{s})} + 2\text{NH}_4^+$ or $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO} \xrightarrow{\text{AgNO}_3 / \text{NH}_3_{(\text{aq})}} \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{COOH} + \text{Ag}_{(\text{s})}$	01
(iii)	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO} + \text{NaHSO}_3_{(\text{aq})} \longrightarrow \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}(\text{SO}_3^-)\text{Na}^+$	01
(c)	<p>Reaction scheme for the synthesis of 2,4-dinitrophenylhydrazine (DNPH) derivative:</p> $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO} \xrightarrow{\text{H}^+} \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}^+$ $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}^+ + \text{H}_2\text{N}-\text{NH}-\text{C}_6\text{H}_3(\text{NO}_2)_2 \longrightarrow \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}(\text{NH}-\text{NH}-\text{C}_6\text{H}_3(\text{NO}_2)_2)^+$ $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}(\text{NH}-\text{NH}-\text{C}_6\text{H}_3(\text{NO}_2)_2)^+ \xrightarrow{-\text{H}_2\text{O}} \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}=\text{N}-\text{NH}-\text{C}_6\text{H}_3(\text{NO}_2)_2$	04
15.(a)(i)	Yield of ammonia increases The formation of ammonia (forward reaction) occurs with a decrease in volume (number of molecules) thus high pressure shifts the equilibrium position from left to the right.	1 1/2
(ii)	Yield of ammonia decreases The forward reaction (formation of ammonia) is exothermic thus an increase in temperature favours the dissociation of ammonia reducing its concentration at equilibrium.	1 1/2



(b)(i)	$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ <table border="1"> <tr> <td>Initial</td><td>3.0</td><td>1.0</td><td>—</td></tr> <tr> <td>Moles</td><td></td><td></td><td></td></tr> <tr> <td>Reacted</td><td><math>\frac{1}{2} \times 0.02</math></td><td><math>\frac{3}{2} \times 0.02</math></td><td><math>0.34 / 17 = 0.02</math></td></tr> <tr> <td>Moles</td><td>0.01</td><td>0.03</td><td>0.02</td></tr> <tr> <td>Equilibrium Moles</td><td>2.99</td><td>0.97</td><td>0.02</td></tr> </table> <p> <math>[\text{N}_2] = 2.99 / 0.5 = 5.98 \text{ mol dm}^{-3}</math> <math>[\text{H}_2] = 0.97 / 0.5 = 1.94 \text{ mol dm}^{-3}</math> <math>[\text{NH}_3] = 0.02 / 0.5 = 0.04 \text{ mol dm}^{-3}</math> </p> <p> <math>K_c = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}</math> <math display="block">= \frac{(0.04)^2}{5.98 \times 1.94^3}</math> <math display="block">= 3.6645 \times 10^{-5} \text{ mol}^{-2} \text{ dm}^6</math> </p>	Initial	3.0	1.0	—	Moles				Reacted	$\frac{1}{2} \times 0.02$	$\frac{3}{2} \times 0.02$	$0.34 / 17 = 0.02$	Moles	0.01	0.03	0.02	Equilibrium Moles	2.99	0.97	0.02	03
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(c)	$4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \longrightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{l})$ $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{NO}_2(\text{g})$ $4\text{NO}_2(\text{g}) + \text{O}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) \longrightarrow 4\text{HNO}_3(\text{aq})$	03																				
9marks																						
16.(a)(i)	<p>Lithium has the smallest atomic radius.</p> <p>Lithium <u>ion</u> has the highest charge density.</p> <p>Lithium has the most negative electrode potential.</p> <p>Lithium is the least electropositive / most electronegative alkali metal.</p>	1 1/2																				
(ii)(b)	<ul style="list-style-type: none"> <li>- Lithium only forms the normal oxide.</li> <li>- Lithium hydroxide is only sparingly soluble in water</li> <li>- When heated Lithium carbonate decomposes to form lithium oxide and carbon dioxide gas.</li> <li>- The nitrate of Lithium decomposes when heated to form an oxide, nitrogen dioxide gas and oxygen.</li> <li>- Lithium reacts with nitrogen to form Lithium nitride.</li> </ul>	03																				
(b)(i)	<p>(any 3)</p> $\text{Mg}_3\text{N}_2(\text{s}) + 6\text{H}_2\text{O}(\text{l}) \longrightarrow 3\text{Mg}(\text{OH})_2 + 2\text{NH}_3(\text{g})$	1 1/2																				

(ii)	$\text{BeCl}_2(\text{s}) + 4\text{NaOH}(\text{aq}) \longrightarrow \text{Na}_2\text{Be}(\text{OH})_4(\text{aq}) + 2\text{NaCl}(\text{aq})$ $\text{or } \text{BeCl}_2(\text{s}) + 4\text{OH}^-(\text{aq}) \longrightarrow \text{Be}(\text{OH})_4^{2-}(\text{aq}) + 2\text{Cl}^-(\text{aq})$ $\text{or } \text{BeCl}_2(\text{s}) + 4\text{OH}^-(\text{aq}) \longrightarrow \text{BeO}_2^{2-}(\text{aq}) + 2\text{Cl}^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$	<p>any one</p> <p>1½</p>
(iii)	$\text{BaO}_2(\text{s}) + 2\text{HCl}(\text{aq}) \longrightarrow \text{BaCl}_2(\text{aq}) + \text{H}_2\text{O}_2(\text{aq})$ $\text{or } \text{BaO}_2(\text{s}) + 2\text{H}^+(\text{aq}) \longrightarrow \text{Ba}^{2+}(\text{aq}) + \text{H}_2\text{O}_2(\text{aq})$	<p>1½</p> <p>09marks</p>
17(a) (i)	Positive deviation	01
(ii)	<p>Addition of hexane weakens the intermolecular hydrogen bonds between ethanol molecules. This increases the escaping tendency of ethanol and hexane molecules from solution into vapor phase hence increasing the vapor pressure above solution which is greater than that expected for ideal solutions.</p>	02
(b)(i)		02
(ii)	<p>distillate – azeotropic mixture or liquid mixture 61.58% hexane and 38.42% ethanol.</p> <p>Residual liquid – Pure hexane</p>	01
(c)	<p>Mass of ethanol in azeotrope = <math>\frac{38.42}{100} \times (50 \times 0.687) = 13.2\text{g}</math></p> <p>Let the mass extracted be <math>x\text{g}</math>.</p> <p><math>K_d = \frac{[\text{ethanol}] \text{ in chloroform}}{[\text{ethanol}] \text{ in hexane}}</math></p> <p><math>15.8 = \frac{x/100}{(13.2-x)/50}</math></p> <p><math>15.8 \times 2(13.2 - x) = x; \quad x = 417.12/32.6 \approx 12.8\text{g}</math></p>	
		09marks

END