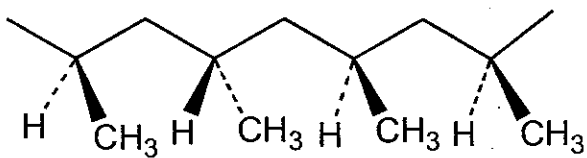

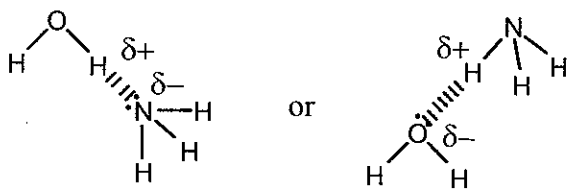


**Mark Scheme 2848**  
**June 2005**

<b>Abbreviations, annotations and conventions used in the Mark Scheme</b>		/ = alternative and acceptable answers for the same marking point ; = separates marking points NOT = answers which are not worthy of credit ( ) = words which are not essential to gain credit <u>      </u> = (underlining) key words which <b>must</b> be used to gain credit ecf = error carried forward AW = alternative wording ora = or reverse argument			
<b>Mark Scheme</b>		<b>Unit Code</b> 2848	<b>Session</b> Jun	<b>Year</b> 2005	<b>Version</b> Final
<b>Question</b>	<b>Expected Answers</b>				<b>Marks</b>
1 a i	rock/earth/gangue/silicates/soil/unwanted minerals <i>Not waste/impurities/dust</i>				1
1 a ii	$\text{PbS} + 1.5\text{O}_2 \rightarrow \text{PbO} + \text{SO}_2$ (or doubled) species (1); balancing (1)				2
1 a iii	lead(II) oxide				1
1 b	$M_r \text{ PbS} = 239$ stated or implied (1); $58 \times 207/239$ ecf = 50.23% (1) Answer to 2sf = 50 (1) (allow 2sf for any number 40 – 60 )				3
1 c i	silver <i>NOT</i> Ag				1
1 c ii	0.01% impurity (1); $\times 10^4 = 100$ ppm(1)				2
1 d i	0, +3 <i>NOT</i> 3+				2
1 d ii	redox				1
1 d iii	<u>hydrogen</u> is flammable/explosive (1); no sources of ignition/sparks/flames (AW) or alternative suitable industrial precaution (1)  or antimony (compounds) toxic (1); avoid breathing dust (AW) or wear gloves (1)  <b>precaution linked to hazard</b>				2
1 d iv	$6p^2$ 6(1) $p^2$ (1) <i>mark separately</i>				2
1 d v	p (block) <i>Allow "P"</i>				1
1 d vi	+5 ; <b>ACCEPT 5+ IF 3+ not awarded in 1(d)(i) allow -3; if mark not awarded in (d)(i) then allow +3;</b>  Group or period comparisons (1)  <i>[Other numbers (e.g. nitrogen oxidation states) can score ONLY if justified]</i>				2
1 e	funnel connected <u>without leaks</u> to side-arm flask (1);  lead shown on filter paper in funnel (1)  Any label in a sensible place from vacuum/ pump/ <u>buchner</u> funnel/side arm flask/ <u>buchner</u> flask (1). <i>Not filter paper</i>				3
					23

2 a i	chlorofluorocarbon <i>ALLOW small spelling errors if meaning is clear</i>	1
2 a ii	any saturated carbon compound with chlorine and fluorine only	1
2 a iii	<i>two from:</i> aerosol (propellants); blowing agents; cleaning agents; refrigerants (aw); coolant in air conditioning units; fire extinguishers	2
2 a iv	2 from in the stratosphere/upper atmosphere (1); uv light (1); causes break down/photodissociation / homolytic fission (1); Plus to chlorine atoms/chlorine radicals/ Cl (1); these catalyse the breakdown of ozone (aw) (1)  QWC: two sentences; spelling ( <i>1 error allowed</i> ), punctuation and grammar correct	4         1
2 b i	$\delta+$ on carbon, $\delta-$ on fluorine(s) (1)	1
2 b ii	mention of electronegativity or explanation (1); comparison of <u>fluorine</u> and <u>carbon</u> (1)	2
2 b iii	Yes, the charges/dipoles do not balance (1); shape is tetrahedral (1)	2
2 c i	uv/radiation (1); does not have high enough energy/ does not have high enough frequency (1) <i>REJECT for second mark answers which imply intensity of radiation</i> <b>"C–F is strong/stronger than C–Cl" scores (1) only if no other mark awarded</b>	2
2 c ii	$467/6.02 \times 10^{23} (1) \times 1000 = 7.75(7)/7.76 \times 10^{-19} \text{ J} (1)$	2
2 c iii	$7.757 \times 10^{-19} \text{ ecf}/6.63 \times 10^{-34} (1) = 1.17 \times 10^{15} (1) \text{ Hz or s}^{-1}(1)$	3
2 c iv	homolytic (fission) ( <i>ignore photodissociation</i> )	1
2 d	uv/visible/ <u>near</u> ir (from sun) (1) <i>not sunlight</i>  (warms) the <u>Earth</u> which radiates ir (1) NOT reflects this increases (1)  <u>vibrational</u> energy of the <u>bonds</u> (1)  QWC: Two sentences, logical, correct use in context of at least three terms below: uv; visible; ir; radiates; radiation; bonds; vibrate	4       1
		27

3 a	CH <sub>3</sub> CHCH <sub>2</sub> or more fully structured	1
3 b i	organometallics/Al joined to an organic molecule	1
3 b ii	poly(ethene)/ldpe/hdpe/conducting polymers/poly(ethyne)/Teflon	1
3 c i	e.g.  1, 2 or 3 carbons changed from original	1
3 c ii	instantaneous (dipole) – induced dipole Van der Waals allow small spelling errors	1
3 c iii	two from: its structure is more organised/(stereo)regular (1); fits/packs together closer/ more points of contact (1); stronger imfs (not bonds) hold the chain in position (allow more in this context) (1)	2
3 c iv	the chains move over each other less easily (1) stronger imf (allow more)(1)	2
3 d i	brown/orange/yellow (1); colourless (NOT clear) (1)	2
3 d ii	(partially) positively charged/electron deficient reagent/attracted to areas of high electron density (1); bonds by accepting a pair of electrons (can be shown via mechanism) (1); two molecules react to form <u>one</u> product (aw) (1) (accept <u>correct explanation of mechanism</u> )	3
3 e i	HBr/hydrogen bromide/hydrobromic acid	1
3 e ii	2-bromopropane ignore commas, dashes and spaces	1
3 e iii	secondary	1
3 e iv	elimination	1
3 f i	NaOH (1); aqueous depends on first mark (1); (just "water" / aqueous OH <sup>-</sup> scores 1) reflux only if any mention of above (1)	3
3 f ii	more collisions <u>per unit time</u> (allow more frequent collisions)	1
3 f iii	1 from molecules have more kinetic energy or more speed (1); more particles (not atoms) collide (1); plus with energy greater than <u>activation energy</u> (1)	2
		24

4 a	nitrogen/N	1
4 b	at least three bent water molecules (1) ; <i>(can be</i>  <i>or triangle)</i> 2 x H and 1 x O with the O facing the ion (1); $\delta^+$ on at least one H, $\delta^-$ on at least one O (1)	3
4 c i	$H^+$ (is acidic)	1
4 c ii	$NH_3 / H_2O$	1
4 d i	<b>N:</b> (very) electronegative N atom/ lone pair <u>on the nitrogen</u> (1); <b>H:</b> a delta positive H / H attached to a more electronegative atom(1)	2
4 d ii	 <p>correct atoms hydrogen bonded with a dashed/dotted line (1); lone pair on relevant N or O (1); partial charges shown for relevant atoms (1) <i>N-H-O straight NOT required</i></p>	3
4 e i	(graduated/volumetric) pipette <i>ALLOW burette</i>	1
4 e ii	Use indicator/pH probe	1
4 f	concentration of $(NH_4)_2SO_4 = 0.01 \text{ mol dm}^{-3}$ ( <i>half</i> $[NH_4^+]$ ) (1);  $M_r(NH_4)_2SO_4 = 132$ ( <i>stated or implied</i> ) (1);  concentration = molarity x $M_r = 1.3(2) \text{ g dm}^{-3}$ (1)  2.6(4) scores (2) overall.	3
		16

2848

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2 c iv	homolytic (fission) (ignore photodissociation)	1
2 d	uv/visible/near ir (from sun) (1) not sunlight (warms) the Earth, which radiates ir (1) NOT reflects this increases (1) vibrational energy of the bonds (1) QWC: Two sentences, logical, correct use in context of at least three terms below: uv; visible; ir; radiates; radiation; bonds; vibrate	4
		1
		27