Mark Scheme

Question	Answer	Marks	Guidance
1	B	1	
2	C	1	

Mark Scheme

Question			Answer	Marks	AO element	Guidance
3	(a)	(i)	$4Pb_2O_3 + 3CH_4 \rightarrow 8Pb + 3CO_2 + 6H_2O$ **OR** $Pb_2O_3 + CH_4 \rightarrow 2Pb + CO + 2H_2O$ **OR** $2Pb_2O_3 + 3CH_4 \rightarrow 4Pb + 3C + 6H_2O$ ✓	**1**	AO2.6	**ALLOW** multiples **IGNORE** state symbols
		(ii)	**ONE Safety issue AND precaution** ✓ **From:** **Safety issue:** Compounds may be toxic/poisonous/flammable **AND** **Precaution**: Use a fume cupboard/good ventilation **----------** **Safety issue:** Lead (compounds) is/are toxic/poisonous **AND** **Precaution**: Wear gloves **----------** **Safety issue:** Methane is flammable **AND** **Precaution**: Keep away from flame **----------**	**1**	AO3.3	**IGNORE** use safety glasses, lab coat (*in question)* and tying hair back, safety screen Definite safety issue needed. Not just 'harmful' **OR** dangerous (Too vague). **FOR OTHER SAFETY ISSUES AND PRECAUTIONS, CONTACT TEAM LEADER**

Mark Scheme

Question	Answer	Marks	AO element	Guidance
(iii)	Any 2 modifications ✓ ✓ from **1.** Heat to constant mass (Ensures all lead oxide has reacted) **2.** Spread/stir/break up lead oxide **OR** increase surface area **OR** use powder rather than lumps (Ensures all lead oxide has reacted) **3.** Pass methane/inert gas/N_2 through tube as it cools **OR** don't pass cold air (Prevents O_2 reacting with Pb) **4.** Use excess methane **OR** more methane (Ensures all lead oxide has reacted) **5.** Bubble (escaping) gas through lime water (Ensures all lead oxide has reacted **OR** ensures all CO_2 has been produced)	**2**	AO3.4 ×2	**ALLOW** response that implies heating to constant mass, e.g. Heat again until the mass does not change **IGNORE** 'heat for longer' *Needs link to constant mass* **IGNORE** 'weigh straight after heating' **IGNORE** idea of repeating the experiment/ taking an average/ getting concordant results / larger sample size, etc.
(iv)	Pb : O Masses(/g): 3.132 **AND** 0.322 **OR** Mole ratios: $\frac{\mathbf{3.132}}{207.2} : \frac{\mathbf{0.322}}{16.0}$ **OR** Mole ratios: 0.0151: 0.020125 ✓ Empirical formula Pb_3O_4 (must come from masses) ✓	**2**	AO2.8 ×2	**NO ECF** from incorrect masses

Mark Scheme

Question	Answer	Marks	AO element	Guidance
(b)	**Type of lattice 2 marks** • **SiO_2**: Giant (covalent lattice) ✓ • **CO_2**: Simple molecular/covalent (lattice) ✓ **----------** **Explanation 2 marks** **1. Forces in CO_2** • Induced dipole–dipole interactions / London forces ✓ **2. Comparison of forces with strength / melting point** • (Covalent) bonds in SiO_2 are stronger **THAN intermolecular** forces in CO_2 **OR** • More energy to break (covalent) bonds in SiO_2 **THAN intermolecular** forces in CO_2 ✓ **ORA**	**4**	AO1.1 ×2 AO1.1 ×1 AO2.1 ×1	**Throughout, IGNORE** 'ionic' for SiO_2 **FOR SiO_2, IGNORE** macromolecular **DO NOT ALLOW** giant **metallic** Mark explanation independently on type of lattice i.e. no **ECF** from incorrect lattice For CO_2 **IGNORE** • covalent bonds • van der Waals' forces • idid • LDF **DO NOT ALLOW** hydrogen bonds **OR** permanent dipole interactions For SiO_2, comparison needs just 'bonds' **OR** 'forces' For intermolecular, **ALLOW** 'between molecules' For comparison, **ALLOW** strong in SiO_2 **AND** weak in CO_2 **DO NOT ALLOW** responses containing intermolecular forces in SiO_2 **IGNORE** 'More bonds'
	Total	**10**		

Mark Scheme

Question	Answer	Marks	AO element	Guidance
4	C	1	2.2	