Gateways School

**Redox & Group 2 & Group 7**

**Revision PPQ Answers**

42 marks

**Q1.**

(a)     A reducing agent gives electrons **(1)**

*Not electron pairs*

**1**

(b)     Zero **(1)**

**1**

(c)     (i)      (+)3 **(1)**

(ii)     –3 **(1)**

(iii)     –1 **(1)**

*Allow answers in roman*

**3**

(d)     (i)      PbO2 + 4H+ +2e– → Pb2+ + 2H2O **(1)**

(ii)     2Cl– → Cl2 +2e(–) **(1)**

(iii)     PbO2 + 4H+ +2Cl– → Pb2+ + Cl2 + 2H2O **(1)**

*Or molecular*

**3**

**[8]**

**Q2.**

(a)     **M1**  Used in a barium meal / barium swallow / barium enema

**OR**  (used to absorb) X-rays

*Credit a correct reference to* ***M1*** *written in the explanation in* ***M2*** *unless contradictory.*

**M2**  BaSO4 / barium sulfate / it is insoluble

*For* ***M2*** *penalise obvious reference to barium or to barium ions being insoluble.*

**2**

(b)     Mg(OH)2    +    **2**HCl        MgCl2    +    2H2O

*Or multiples.*

*Ignore state symbols.*

**1**

(c)     It / magnesium hydroxide is insoluble / insufficiently soluble / sparingly soluble / less soluble than barium hydroxide / forms low concentration solutions

*Weak alkali alone is insufficient.*

*Formation of a precipitate needs explanation.*

**1**

(d)     TiCl4    +    **2**Mg        **2**MgCl2    +    Ti

*Or multiples.*

*Ignore state symbols.*

**1**

(e)     **M1** Hydrogen / H2 produced

**OR** an equation to produce hydrogen / H2

      ( eg Mg + **2**H2O     Mg(OH)2 + H2)

      ( eg Mg +    H2O     MgO + H2)

*For* ***M1***

*Do not penalise an incorrect equation; the mark is for H2 or hydrogen.*

*Award one mark only for ‘exothermic reaction with steam / H2O’ for a student who has not scored* ***M1***

**M2** requires correct **M1**

      risk of explosion

**OR** forms explosive mixture (with air)

**OR** (highly) flammable

*Ignore ‘violent’ reaction.*

**2**

**[7]**

**Q3.**

(a)     Hydrochloric acid = **C**

**1**

Barium chloride = **A**

**1**

(b)     Barium sulfate is insoluble

**1**

CuSO4 + BaCl2 → BaSO4 + CuCl2

*Accept multiples.*

*Accept ionic equation.*

*Do not penalise lack of state symbols, but if used they must be correct.*

**1**

(c)     CO2 / Carbon dioxide

**1**

(d)     Reagent 1 silver nitrate (solution)

*Ignore lack of reference to acidifying prior to addition of silver nitrate solution.*

**1**

Observation 1 White precipitate

**1**

Reagent 2 (dilute) ammonia solution / aqueous ammonia

*Do not accept addition of* ***ammonia*** *only.*

**1**

Observation 2 (Colourless) solution

*Allow ppt dissolves.*

*Do not allow ‘goes colourless’ or ‘goes clear’.*

*Chlorine and no visible change or solution does not*

*become orange scores M3 and M4.*

**1**

(e)     Gloves / wash hands after use

*Ignore ‘eye protection’.*

*Do not accept ‘do not ingest the chemicals’, ‘wipe up spillages’, ‘use a fume cupboard’, ‘wear a lab coat’ (list principle).*

**1**

**[10]**

**Q4.**

(a)      (i)     **M1**    iodine ***OR*** I2 OR I3–

*Ignore state symbols*

*Credit* ***M1*** *for “iodine solution”*

**M2**    Cl2 + **2**I –  **2**Cl – + I2***OR***½ Cl2 + I –  Cl – + ½ I2

*Penalise multiples in M2 except those shown*

***M2*** *accept correct use of I3–*

**M3**    redox or reduction-oxidation or displacement

**3**

(ii)     **M1**    (the white precipitate is) silver chloride

***M1*** *must be named and for this mark ignore incorrect formula*

**M2**    Ag+ + Cl –  AgCl

*For* ***M2*** *ignore state symbols*

*Penalise multiples*

**M3**    (white) precipitate / it dissolves

***OR***    colourless solution

*Ignore references to “clear” alone*

**3**

(b)     (i)      **M1**    H2SO4 + **2**Cl –  **2**HCl + SO42–

*For* ***M1*** *ignore state symbols*

***OR***    H2SO4 + Cl–  HCl + HSO4–

*Penalise multiples for equations and apply the list principle*

***OR***    H+ + Cl–  HCl

**M2**    hydrogen chloride ***OR*** HCl ***OR*** hydrochloric acid

**2**

(ii)     **M1 and M2 in either order**

*For* ***M1*** *and* ***M2****, ignore state symbols and credit multiples*

**M1    2**I –  **I**2 + **2**e –

***OR***

**8**I –  **4**I2 + **8**e –

*Do not penalise absence of charge on the electron*

*Credit electrons shown correctly on the other side of each equation*

**M2**    H2SO4 + **8**H+ + **8**e –  H2S + **4**H2O

**OR**

SO42– + **10**H+ + **8**e –  H2S + **4**H2O

*Additional equations should not contradict*

**M3**    oxidising agent / oxidises the iodide (ions)

***OR***

electron acceptor

**M4**    sulfur ***OR*** S ***OR*** S2 ***OR*** *S8* ***OR*** *sulphur*

**4**

(iii)     **M1**    The NaOH / OH– / (sodium) hydroxide reacts with / neutralises the  
H+ / acid / HBr (lowering its concentration)

***OR***  a correct neutralisation equation for H+ or HBr with NaOH or with  
hydroxide ion

*Ignore reference to NaOH reacting with bromide ions*

*Ignore reference to NaOH reacting with HBrO alone*

**M2    Requires a correct statement for M1**

The (position of) equilibrium moves / shifts(from L to R)

•        to replace the H+ / acid / HBr that has been removed / lost

•        ***OR***  to increase the H+ / acid / HBr concentration

•        ***OR*** to make more H+ / acid / HBr / product(s)

•        ***OR*** to oppose the loss of H+ / loss of product(s)

•        ***OR*** to oppose the decrease in concentration of product(s)

*In* ***M2****, answers must refer to the (position of) equilibrium shifts / moves and is not enough to state simply that it / the system / the reaction shifts to oppose the change.*

**M3**    The (health) benefit outweighs the risk or wtte

***OR***

a clear statement that once it has done its job, little of it remains

***OR***

used in (very) dilute concentrations / small amounts / low doses

**3**

**[15]**

**Q5.**

B

**[1]**

**Q6.**

D

**[1]**