Gateways School

**Amount of substance**

**Revision PPQ Answers**

32 marks

**Q1.**

(a)     (i)      M1 - *M*r calcium phosphate = 310(.3)

*If Mr wrong, lose M1 and M5.*

**1**

M2 - Moles calcium phosphate =        (= 0.0234)

*0.0234 moles can score M1 and M2.*

*If Mr incorrect, can score M2 for .*

*Allow M2 and / or M3 to 2 significant figures here but will lose M5 if answer not 1.23.*

**1**

M3 - Moles phosphoric acid = 2 × 0.0234 = 0.0468

*Allow student’s M2 × 2. If not multiplied by 2 then lose M3 and M5.*

**1**

M4 - Vol phosphoric acid = 0.038(0) dm3

*If not 0.038(0) dm3 then lose M4 and M5.*

**1**

Conc phosphoric acid = 

M5 = 1.23 (mol dm−3)

*This answer only – unless arithmetic or transcription error that has been penalised by 1 mark.*

*Allow no units but incorrect units loses M5.*

**1**

(ii)      × 100    **OR**     × 100

*1 mark for both Mr correctly placed.*

= 71.5%

**2**

(b)     3Ca(OH)2 + 2H3PO4  Ca3(PO4)2 + 6H2O

*Allow multiples.*

**1**

(c)


*If x = 2 with no working, allow M4 only.*

*Ca = 1.67 g (M1).*

**1**

*Mark for dividing by correct Ar in Ca and P (M2).
If M1 incorrect can only score M2.*

**1**

*Correct ratio (M3).*

**1**

CaH4P2O8    **OR**    Ca(H2PO4)2    **OR**    x = 2

*Value of x or correct formula (M4).*

**1**

**Alternative**

Ca                   H2PO4

*Ca = 1.67 g (M1).*

**

*Mark for dividing by correct Ar / Mr in Ca and H2PO4 (M2).
If M1 incorrect can only score M2.*

**

*Correct ratio (M3).*

CaH4P2O8    **OR**    Ca(H2PO4)2    **OR**    x = 2

*Value of x or correct formula (M4).*

**[12]**

**Q2.**

(a)     Any **three** from:

A method of weighing by difference / wash the solid from its weighing container into the beaker

*If the nature of any washing is imprecise penalise once only.*

Wash the (wet) rod into the flask / beaker after use

*Do not allow a method where the solution is made up directly in the flask.*

Wash the (wet) beaker into the flask after transfer

*Ignore any instructions that refer to rinsing equipment (before use) or use of deionised water.*

Wash the filter funnel (after transfer) into the flask

Use a teat pipette to make up to the mark on the volumetric flask

Ensure the bottom of the (liquid) meniscus is on the graduation mark

Mix / shake the final solution in the flask / invert flask

**Max 3**

(b)     Do (a) further titration(s)

*Mark these points independently.*

**1**

To obtain concordant results

*Allow results with ± 0.1*

**1**

**[5]**

**Q3.**

(a)     Space will fill during titration / titres or volumes added are too high

*Do not allow ‘to improve accuracy’ without qualification.*

*Do not allow ‘incorrect end-point’ without qualification.*

*Do not allow ‘titres or volumes added are too low’.*

*Ignore ‘titres or volumes added are different’.*

**1**

(b)     Less chance of losing liquid on swirling / liquid doesn’t splash on swirling

*Do not accept ‘easier to swirl’ on its own.*

**1**

(c)     (i)      Returns reagent on the sides of the flask to the reaction mixture (to ensure that all of the acid / alkali reacts)

*Do not allow ‘to improve accuracy’ without qualification.*

*Ignore reference to cleaning.*

**1**

(ii)     This does not change the number of moles of reagents / water is not a reagent / water is one of the products

*Do not allow ‘water does not affect the titration’ without qualification.*

*Ignore ‘water is neutral / has a pH of 7’.*

**1**

(d)     Idea that a single titration could be flawed / anomalous

*Do not accept ‘will improve reliability / reproducibility / accuracy’ without further qualification.*

*Allow ‘to obtain concordant results’.*

**1**

**[5]**

**Q4.**

(a)     Stage 1

*M*r for Mg(NO3)2 = 148.3

Moles of Mg(NO3)2 =    = 2.522 × 10-4 mol

*Extended response calculation*

**1**

Stage 2

Total moles of gas produced = 5/2 × moles of Mg(NO3)2

= 5/2 × 2.522 × 10–4 = 6.305 × 10–4

*If ratio in stage 2 is incorrect, maximum marks for stage 3 is 2*

**1**

Stage 3

*P*V = nR*T* so volume of gas V = *n*RT / *P*

**1**

*V*  =  = 1.745 × 10–5 m3

**1**

*V* = 1.745 × 10–5 × 1 × 106 = 17.45 cm3 = 17.5 (cm3)

*Answer must be to 3 significant figures (answer could be 17.4 cm3 dependent on intermediate values)*

**1**

(b)     Some of the solid is lost in weighing product / solid is blown away with the gas

**1**

**[6]**

**Q5.**

A

**[1]**

**Q6.**

B

**[1]**

**Q7.**

D

**[1]**

**Q8.**

D

**[1]**