mark scheme abbreviations

; separates marking points
/
alternative responses for the same marking point
not do not allow
allow accept the response
ecf error carried forward
avp any valid point
ora or reverse argument
owtte or words to that effect

underline actual word given must be used by candidate (grammatical variants excepted)

( ) the word / phrase in brackets is not required but sets the context
max indicates the maximum number of marks

Any [number] from: accept the [number] of valid responses

note: additional marking guidance
1 (a) tap / separating / dropping funnel;  
not: burette  
delivery tube;  
gas jar;  
allow: measuring cylinder  

(b) gas should be collected downwards / owtte  

(c) to remove water / to remove impurities  

2 (a) volume boxes completed correctly 0, 13, 22, 30, 36, 43, 49  
note: all 7 correct = 2, 6 correct = 1, <6 correct = 0  

(b) volume boxes completed correctly 0, 5, 10, 13, 17, 20, 23  
note: all 7 correct = 2, 6 correct = 1, <6 correct = 0  

(c) appropriate scale on x-axis and y-axis and labels and units;  
note: scale should cover at least half of grid  
points plotted to ± half a small square accuracy;;  
note: >12 correct = 2, 10–12 correct = 1, <10 correct = 0  
two labelled smooth line graphs and must plot volume at t = 0;  

(d) Experiment 1 / acid X and statement that acid X is stronger or more concentrated / ora  

(e) 71–73 s and indication shown on graph;  
allow: ecf from incorrect graph  

(f) 13 ÷ 30 = 0.43;  
allow: 0.4  
allow: ecf on plotting  
cm³/s / cm³s⁻¹ / cm³ per s;  
allow: sec  

(g) advantage: convenient / easy / quick to use;  
disadvantage: reference to inaccurate measurement;  

(h) graduated pipette / burette / gas syringe / mass of magnesium rather than strips / repeats  
and take average / take more frequent readings / suitable method for reducing initial loss of  
gas and any suitable comment on improved accuracy;  
note: explanation must relate to reason
3  (a) platinum / graphite / carbon
(b) damp blue litmus paper / Universal indicator paper / pH paper; bleaches / turns white;
(c) hydrogen

4  (a) (i) white precipitate
(ii) precipitate dissolves in excess;
(iii) white precipitate;
     no change / precipitate remains;
(b) contains water / hydrated
(c) ammonia
     not: ammonium
(d) Any two from:
     nitrate;
     hydrated salt / contains water;
     it is not a sulfate;
(e) sodium hydroxide is hazardous / irritant / caustic;
     allow: toxic
     boiling causes mixture to spit / blow-out;

5  (a) Universal indicator / pH paper;
    pH of 4–6 / yellow / orange;
    note: any suitable test with appropriate result
(b) Any four from:
    chromatography;
    description of applying food colouring to paper;
    use of solvent;
    results / number of spots;
    compare results to known sample / reference to $R_f$ value;
    marks can be obtained from a labelled diagram