

## Mark schemes

**Q1.**

- (a) (test) add barium chloride (solution)  
*ignore (hydrochloric / nitric / sulfuric) acid*  
*allow add barium nitrate (solution)* 1
- (result) white precipitate  
*MP2 is dependent upon MP1 being awarded* 1
- (b) the yield is smaller at higher temperatures because the reaction is exothermic 1
- (c) there are more moles / molecules (of gas) on the left  
*allow converse*  
*ignore particles* 1
- (so the position of) equilibrium shifts to the right 1
- (d) any **two** from:  
 • the yield is already high  
 • more energy required  
 • risk of explosion is increased  
 • higher income from increased yield is outweighed by the extra expenditure  
 • increased cost of safety precautions  
*allow requires stronger vessels*  
*allow requires thicker walls* 2
- (e) vanadium (V) 1

**[8]**