

## Preliminary Round 2020, Team Round.

## RSC Birmingham &amp; West Midlands Local Section.

Time 10 Minutes. All answers must be written on this Question/Answer sheet.

Intro: Ammonium Nitrate,  $\text{NH}_4\text{NO}_3$  Recently in the headlines as the compound responsible for the massive, devastating and tragic explosion in Beirut. It is used, in a controlled way, as an explosive for mining and quarrying as well as being a widely used artificial fertiliser replacing nitrogen compounds lost from the soil.

	Question	Answer
1	Ammonium nitrate is manufactured using ammonia and nitric acid. Write a balanced chemical equation for this reaction.	
2	What is the colour of solid $\text{NH}_4\text{NO}_3$ ?	
3	[a] what is the name of the Industrial process for producing ammonia from $\text{N}_2$ and $\text{H}_2$ gases? [b] name the catalyst used for this process.	[a] [b]
4	Calculate the % of nitrogen in ammonium nitrate, $\text{NH}_4\text{NO}_3$ .	
5	NPK fertilisers contain potassium compounds and phosphorus compounds e.g calcium phosphate. The phosphate ion is $\text{PO}_4^{3-}$ , what is the formula of calcium phosphate?	
6	The elements K and P are very reactive and need to be stored safely. How are [a] K and [b] P stored in the chemistry lab?	[a] [b]
7	Some plants have nodules on their roots that contain bacteria that convert atmospheric nitrogen into nitrogen compounds in the soil. Clover is one example. What is the name of this group of plants?	
8	What is the number of covalent bonds between the atoms in a nitrogen molecule?	
9	Nitrogen forms several oxides e.g. $\text{N}_2\text{O}$ , $\text{NO}$ and $\text{NO}_2$ . What is the colour of [a] $\text{NO}$ , and [b] $\text{NO}_2$ ? [c] $\text{N}_2\text{O}$ gas is used as an anaesthetic. What is its 'trivial' common name?	[a] [b] [c]
10	$2 \text{NO}_2 \rightleftharpoons \text{N}_2\text{O}_4 \quad \Delta H -ve$ [a] what does the $\rightleftharpoons$ sign represent, and [b] what effect would lowering the temperature have on the reaction?	[a] [b]