1. How dense is ammonia compared to air?
Solution:
Ammonia has less density when compared to air.

2. What does the Fountain Experiment demonstrate?
Solution:
The Fountain Experiment demonstrates that ammonia gas possesses high solubility in water.

3. What is the balanced equation for the reaction that occurs between sulphuric acid and ammonia?
Solution:
The balanced equation for the above reaction is as follows:

$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$

4. Pick the odd ones out - Sulphur dioxide, carbon dioxide, hydrogen chloride, ammonia
Solution:
Ammonia is the odd one out as it is basic.

5. Gas 'Z' gives off dense white fumes when it reacts with chlorine. Its aqueous solution exhibits a blue colour with copper (II) hydroxide.
1. What is gas 'Z'?
2. State 'Z's' formula.
Solution:
1. Z is ammonia.
2. The formula for ammonia is NH_3

6. State few applications of ammonia.
Solution:
Ammonia has many applications:
1. Ammonia is used primarily as a fertilizer
2. Ammonia is also used as a refrigerant gas
3. Used in the production of explosives and plastics
4. It is used in the production of household cleaning solutions and industrial-strength cleaning solutions.
5. Ammonia also has applications as a pesticide
6. Ammonia is also used in the manufacture of sodium carbonate by the Solvay process.

7. What happens when ammonium hydroxide is added to the aqueous solution of Zinc nitrate?
Solution:
When this reaction occurs, a gelatinous white precipitate of zinc hydroxide is formed. It is soluble in ammonium hydroxide.
Reaction: $Zn(NO_3)_2+2NH_4OH \rightarrow 2NH_4+NO_3+Zn(OH)_2$

8. What happens when ammonium hydroxide is added to the aqueous solution of Iron(II) sulfate?
Solution:
A green-ish precipitate of ferrous hydroxide is formed. It is insoluble in excess of ammonium hydroxide.
Reaction: $FeSO_4+2NH_4OH \rightarrow [NH_4]_2SO_4+Fe(OH)_2$

9. How do you distinguish between ferric salt and ferrous salt through a chemical test?
Solution:
Using a dropper, ammonium hydroxide can be added to two test tubes containing the salts:
- The test tube with ferrous salt will result in a dull-green precipitate.
- The test tube with a ferric salt will result in a reddish-brown precipitate of its hydroxides.

10. Name the following:
1. What is the gas created by Haber's process?
2. The two gases, when combined with ammonia, gives dense, white fumes.
Solution:
1. Ammonia
2. Chlorine and hydrogen chloride

11. Which salts of ammonia are used in the following:
1. Medicine
2. Explosives
3. Dry cell
Solution:
1. Ammonium carbonate
2. Ammonium nitrate
3. Ammonium chloride

12. Name the acidic gas that reacts with a basic gas, resulting in the formation of neutral gas.
Solution:
Hydrogen chloride
When hydrogen chloride reacts with a basic gas such as ammonia, ammonium chloride is formed - which is a neutral gas.

13. Answer the following:
1. Name the metallic chloride which is soluble in ammonium hydroxide.
2. Name the gas formed when ammonia is burnt in an atmosphere containing oxygen (no catalyst present)
Solution:
1. Silver chloride
2. Nitrogen

14. What is the salt produced by the reaction of basic gas and an acid gas?

Solution:
Ammonium chloride is the salt produced by the reaction of a basic gas and an acid gas.

15. Ammonia is produced when sodium hydroxide solution is used to warm ammonium salt. State the ways to identify ammonia gas.
Solution:
- Ammonia has a distinct pungent odour.
- Ammonia turns a moist yellow litmus paper brown, a moist red litmus paper blue, and phenolphthalein solution pink.

16. What is an alternative to chlorofluorocarbons?
Solution:
A suitable alternative to chlorofluorocarbon is ammonia in liquid form. It is also environmentally friendly and does not cause any of the global repercussions as chlorofluorocarbons.

17.
(a) Why are ammonium ions formed when ammonia is dissolved in water?
(b) Name the other ion formed when ammonia is dissolved in water.
Solution:
(a) Ammonia ions are formed due to the basic nature of ammonia molecules.
(b) Hydroxyl ions are also formed alongside ammonia ions.

18. Why is ammonia a suitable refrigerant?
Solution:
Ammonia's pressure is low enough to produce the temperatures needed for refrigeration. It also carries more heat per kg than other traditional refrigerants. Moreover, it is also non-corrosive to metals used in the construction of fridges and other pieces of equipment used for refrigeration.

19. What type of displacement method is used to collect ammonia?
Solution:
Since ammonia is lighter than air, downward displacement of air is used to collect ammonia. Moreover, ammonia cannot be collected using water because it is highly soluble in water.

20. Name the resultant gases when the following compounds are heated:
1. Ammonium chloride & Calcium hydroxide
2. Ammonium chloride & Sodium nitrite
Solution:
1. Ammonia
2. Nitrogen