1. A primary amine has the group:

   ☐ –COO–

   ☐ –OH

   ☐ $–NH_2$

   ☐ –COOH

2. Phenylamine is made from benzene by:

   ☐ oxidising benzene with hot alkaline $KMnO_4$

   ☐ free-radical substitution of benzene with NH_3 under UV

   ☐ nitrating to nitrobenzene, then reducing (Sn/conc. HCl, then NaOH)

   ☐ adding ammonia to benzene in the presence of water

3. An amide is made from an acyl chloride and:

   ☐ an alkene and a catalyst

   ☐ ammonia or a primary amine

   ☐ water at room temperature

   ☐ an alcohol (or a phenol)

4. An amino acid contains:

   ☐ only an acidic –COOH group

   ☐ both a basic $–NH_2$ group and an acidic –COOH group

   ☐ an –OH group and a C=C double bond

   ☐ only a basic $–NH_2$ group

5. A primary amine is made by heating a halogenoalkane with:

   ☐ ammonia in ethanol, under pressure

   ☐ water

   ☐ acidified dichromate

   ☐ bromine

6. Phenylamine can be used to make azo dyes via a diazonium salt.

   ☐ True ☐ False

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_____

8. Amino acids contain both an amino group and a carboxylic acid group.

   ☐ True ☐ False

9. Amines act as bases because the nitrogen has a lone _____.

_____

10. The order of basicity is:

    ☐ phenylamine < ammonia < ethylamine

    ☐ ammonia < ethylamine < phenylamine

    ☐ all equal

    ☐ ethylamine < ammonia < phenylamine

1. **$-NH_2$**

   A primary amine has $-NH_2$; a secondary amine has –NH– between two carbons.

2. **nitrating to nitrobenzene, then reducing (Sn/conc. HCl, then NaOH)**

   Benzene → nitrobenzene (nitration) → phenylamine (reduction with tin and acid, then NaOH).

3. **ammonia or a primary amine**

   Ammonia or a 1°/2° amine reacts with an acyl chloride to give an amide.

4. **both a basic $-NH_2$ group and an acidic –COOH group**

   Having both groups is what makes amino acids behave as they do (zwitterions, peptide bonds).

5. **ammonia in ethanol, under pressure**

   Ammonia substitutes the halogen to give the amine (excess NH_3 favours the primary amine).

6. **True**

   Azo compounds are brightly coloured.

7. **amide**

   Formed from an acyl chloride and ammonia or an amine.

8. **True**

   They can act as both acid and base (zwitterions).

9. **pair**

   It accepts a proton.

10. **phenylamine < ammonia < ethylamine**

    Ethylamine's alkyl group makes its lone pair most available; phenylamine's lone pair is delocalised into the ring, so it is weakest.

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