Chapter Summary Worksheet

Chapter 13 Organic nitrogen compounds

Print out and complete this worksheet to generate a summary for Chapter 13.

1 Which compound is **not** an amine?

- ☐ **A** CH_3NH_2
- ☐ **B** $(CH_3)_2NH$
- ☐ **C** CH_3CONH_2
- ☐ **D** $CH_3COCH_2NH_2$

2 Which reaction shows that 1-butylamine is an alkali?

- ☐ **A** $CH_3CH_2CH_2CH_2NH_2 + HCl \rightarrow CH_3CH_2CH_2CH_2NH_3^+Cl^-$
- ☐ **B** $CH_3CH_2CH_2CH_2NH_2 + H_2O \rightarrow CH_3CH_2CH_2CH_2NH_3^+ + OH^-$
- ☐ **C** $CH_3CH_2CH_2CH_2NH_2 + CH_3COCl \rightarrow CH_3CH_2CH_2CH_2NHCOCH_3 + HCl$
- ☐ **D** $4CH_3CH_2CH_2CH_2NH_2 + [Cu(H_2O)_6]^{2+} \rightarrow [Cu(CH_3CH_2CH_2CH_2NH_2)_4]^{2+} + 6H_2O$

3 Phenylamine reacts with:

- ☐ **A** sodium hydroxide to give a salt
- ☐ **B** sodium nitrite and hydrochloric acid at 35°C to give benzenediazonium chloride
- ☐ **C** liquid bromine in the presence of an anhydrous aluminium chloride catalyst to give 2-bromophenylamine
- ☐ **D** bromine water to give a white precipitate of 2,4,6-tribromophenylamine

4 Nitrobenzene is reduced to phenylamine by:

- ☐ **A** tin and dilute HCl
- ☐ **B** iron and concentrated HCl
- ☐ **C** potassium dichromate in acid solution
- ☐ **D** hydrogen in the presence of a copper catalyst

5 Poly(ethenol) is soluble in water because:

- ☐ **A** it can form many hydrogen bonds with water molecules
- ☐ **B** it is a polar molecule
- ☐ **C** it reacts with water to form ions
- ☐ **D** the polymer breaks down in water into ethenol molecules

6 Which compound **cannot** form a polymer with identical molecules?

- ☐ **A** $NH_2CH(CH_3)COOH$
- ☐ **B** $HOCH(CH_3)COOH$
- ☐ **C** $HOCH(CH_3)NH_2$
- ☐ **D** $HOCH(CH_3)COCl$

7 Glycine, NH_2CH_2COOH, has a high melting temperature because:

- ☐ **A** it forms ionic bonds within the zwitterion
- ☐ **B** it forms ionic bonds with other zwitterions
- ☐ **C** the zwitterion is in equilibrium with the neutral molecule
- ☐ **D** the zwitterion has many electrons

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8 With which of the following do amino acids **not** react?

- ☐ **A** H^+(aq) ions
- ☐ **B** OH^-(aq) ions
- ☐ **C** ethanol in the presence of concentrated sulfuric acid
- ☐ **D** bromine water

9 A mixture of amino acids can be separated by thin-layer chromatography (TLC) because:

- ☐ **A** different amino acids have different R_f values
- ☐ **B** different amino acids have different pH values in solution
- ☐ **C** they react with ninhydrin to form a coloured product
- ☐ **D** different amino acids have different molar masses

10 The low-resolution NMR spectrum of a solution of serine, $NH_2CH(CH_2OH)COOH$, in a non-polar solvent has:

- ☐ **A** five peaks with heights in the ratio 2:2:1:1:1
- ☐ **B** four peaks with heights in the ratio 2:2:2:1
- ☐ **C** four peaks with heights in the ratio 3:2:1:1
- ☐ **D** three peaks due to N–H, C–H and O–H bonds

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