1. B To solve this problem, imagine yourself in possession of a 100 g sample of the substance, in which case you would have 39g of carbon, 45 g nitrogen, and 16 g of hydrogen. How many moles would this be. Do these computations in your head if you can and estimate:

$$\frac{39\text{ g}}{12\text{ g/mol}} = 3\tfrac{1}{4}\text{ mol}$$

$$\frac{45\text{ g}}{14\text{ g/mol}} = 3\tfrac{1}{4}\text{ mol}$$

$$\frac{16\text{ g}}{1\text{ g/mol}} = 16\text{ mol}$$

This ratio is 1:1:5 or thereabouts, making B the best answer.

2. D Method A would allow utilization of the ideal gas law:

$$PV = nRT$$

by which the number of moles could be determined and thus the grams per mole or molecular weight of the compound.
From method B, we could tell how many amine groups are present. There would be a steep drop in pH at the equivalence point, when the amine groups are all hydrated. (Before this point, the solution, containing a weak base and its salt, acts as a buffer)
Method C could give us valuable information about the structure of the molecule but would probably not provide definitive answers in itself.

3. B The weights of water and carbon dioxide correspond to two moles of each. From this we know that four moles of hydrogen and two moles of carbon were consumed in the reaction. Figuring out how much oxygen, necessary to differentiate A & B, is more difficult because we don't know how much reacted from the air. We do know the weight of the original sample, which if we subtract out the weight of four moles of hydrogen and two of carbon, we are left with 16 grams of oxygen, or one mole.

4. C $6HCl + 2Cr \longrightarrow 2CrCl_3 + 3H_2$

5. D From the reaction it can be seen that one mole of acetylene is produced for every two moles of water consumed. Remember that one ml of water equals one gram, so 18 ml would equal one mole. Therefore, 0.5 moles of acetylene is produced.