SEM-EDS Questions

1. SEM-EDS is a technique that provides both high magnification and high resolution photographs with SEM and elemental analysis with EDS.
2. The sample needs to be of a small size, less than 3cm, and needs to be flat and a cross section.
3. EDS cannot detect the lightest elements in materials
4. For BSE, a sample needs to be mounted and polished flat. If the material is glass, glaze, or obsidian and does not conduct electrons then it needs to be coated in order to prevent distortion and deflection of the electron beams
5. SEM-EDS is not invasive but is destructive. Because the samples must be of a small size and also polished or etched this can cause destruction to the material.
6. The SEM is primarily used for imaging any structurally or compositionally heterogeneous materials.
7. Secondary Electrons (SE) produce SEM images while backscattered electrons (BSE) are used to create a BSE image of the surface, which maximizes the contrast between similar phases. EDS information gives the user the elemental compositional makeup of the sample.

XRD & XRF Questions

1. XRF determines elemental composition and is suitable for solids, liquids, and powders. It is non-invasive, non-destructive, and a relatively time efficient technique. XRD performs compound analysis of materials with crystalline structure. It is non-destructive as a process, but the material needs to be relatively small. The technique is also constricted by the fact that it has to be flat-surfaced and not polished or etched. This technique is not as time efficient as XRF.
2. XRD analysis cannot identify amorphous materials as well as having no depth profile information. And because it can only identify materials which have a crystalline structure, it can not identify such archaeological materials which don’t have such a structure (i.e. plastics, glass, fibers, and dyestuffs).
3. The handheld XRF does not have a sample size constriction, while the tabletop one does. The XRD sample must also be small.