Assignment 4

Due date: 2023-02-25, 22:06 EST.

1. Given below is the block diagram of X-Ray spectrometer, identify the numbered component.
   - [Diagram]
   - Number 1: Monochromator
   - Number 2: Filter
   - Number 3: Specimen
   - Number 4: Detectors

   Numbered Answers:
   - Number 1: Monochromator
   - Number 2: Filter
   - Number 3: Specimen
   - Number 4: Detectors

2. In X-ray diffraction, the identification of a component of the sample from its powder diffraction pattern is based upon the ______ of lines and their ______.

   Numbered Answers:
   - Number of spots
   - Intensity

3. X-ray diffraction patterns are used to study crystal structure of solids because ______.
   - They have high energy, hence they can penetrate through solids
   - They are electromagnetic radiation, hence do not interact with matter (crystals)
   - Heat wavelengtch is comparable to interatomic distances
   - Their high frequency enables rapid analysis

   Numbered Answers:
   - A
   - B
   - C
   - D

4. For two diffractions to be true, the path difference between the two waves should be ______.

   Numbered Answers:
   - A
   - B
   - C
   - D

Note: Your answer must be in integer, 24 hours time.

5. Micropolarization phenomena reduces the intensity of X-ray diffracted beam. The effect of micro polarization is reduced when ______.
   - Sample is free from ground
   - Sample is crystallographic
   - Sample has low coefficient of x-ray absorption
   - Sample is exposed to x-ray absorption

   Numbered Answers:
   - A
   - B
   - C
   - D

6. List the following parameters that can be determined using X-ray diffraction technique ______.
   - Crystal structure identification
   - Lattice parameter measurement
   - Lattice parameter of x-ray absorption coefficients
   - Lattice parameter of crystal orientation

   Numbered Answers:
   - A
   - B
   - C
   - D

The following diffraction pattern was collected for a specimen: 13°, 22°, 27°, 35°, 42°, 49°, 50°, 56°, 78°, 89°, 75°, 78°, 82°, 85°, 89°, 90°, and 48°.

7. The structure of the specimen is ______.
   - BCS salts
   - BOC salts
   - PEC salts
   - Standard salts

   Numbered Answers:
   - A
   - B
   - C
   - D

8. Using the wavelength of a ray to be 1.5 A, calculate the lattice constant, a in A.

   Numbered Answers:
   - A
   - B
   - C
   - D

Based on the diffraction pattern shown below determine the source cement:

   [Diagram]
   - Portland cement
   - White Portland cement
   - Calcium Alginate cement
   - Calcium Sulfoaluminate cement

   Numbered Answers:
   - A
   - B
   - C
   - D