



COMPREHENSIVE Examinations, 01 May, 2018

PART A (CLOSED BOOK)

Maximum Marks: 20

Duration: 30 minutes

Marks Obtained	

Name: ID

Answer all Questions

1. Pick up the correct answer (Each wrong answer will deduct 0.25 marks):

[1×10]

(i) The prime consideration of a capacitor design of a material is its

- (A) permittivity (B) permeability (C) dielectric constant (D) reflectivity

(ii) Heavy metal sponge contains

- (A) mesoporous silica functionalized with alkanethiol groups (B) zeolites functionalized with enzymes
(C) MOF functionalized with alkanethiol groups (D) macroporous silica functionalized with enzyme

(iii) When a material does not interact with light then it is

- (A) Raman scattering (B) reflection (C) refraction (D) transmission

(iv) The most commonly used ligand in the MOF synthesis is

- (A) ethylene diamine (B) 1,4 benzenedicarboxylate (C) porphyrin (D) pyridine

(v) Introduction of porosity in a material causes

- (A) increase of scattering of light (C) increase of transmission of light
(B) increase largely the absorption coefficient (D) increase reflection of light

(vi) The conductivity ($\Omega^{-1} \cdot m^{-1}$) of gold at 200°C is, ($\rho_{20^\circ C} = 24.4 \times 10^{-9} \Omega \cdot m$ and $\alpha = 0.0034^\circ C^{-1}$)

- (A) 18.8×10^{-9} (B) 25.4×10^6 (C) 39.3×10^{-9} (D) 58.4×10^3

(vii) A reaction has ΔG^0 at 373K as 25 kJ/mol. The reaction

- (A) may happen at higher temperature (B) is governed by activation energy
(C) does not require a catalyst to proceed at 373 K (D) may proceed with a catalyst at 373 K

(viii) Kaolinite, Illite, Montmorillonite are

- (A) macroporous materials (B) mesoporous materials (C) microporous materials (D) nanomaterials

(ix) Barium titanate is

- (A) ferrimagnetic due to its tetragonal structure (B) ferroelectric due to its tetragonal structure
(C) ferromagnetic due to its cubic structure (D) ferrielectric due its cubic structure

(x) X-ray emission can take place from

- (A) 3d to 2s (B) 3p to 2p (C) 2s to 3p (D) 3p to 2s

Q2. Mention any of the two popular techniques of encapsulation (ship-in-a-bottle) of complexes inside zeolite pore and describe it very briefly

[2]



Q3. How does the conductivity of n-type semiconductor vary with temperature? [2]

Q4. With the help of a diagram, show initial and maximum permeability of a material when subjected to magnetic field. [2]

Q5. MnO shows antiferromagnetism. How? [2]

Q6. Show the mechanism of acid catalyzed hydrolytic poly-condensation of silicon alkoxides to silica. [2]
