

MNT 503
Nanoscale Synthesis and Characterization
(2024-2025 Spring)

Assignment 5

1- Which one of the followings is not related to sol-gel technique?

- ☐ bottom-up technique
- ☐ can be used to produce nano powders, coating, nano fibers, xerogel and aerogel
- ☐ all kind of materials (polymer, metals and oxides) can be produced by this technique
- ☐ starting solution is initially converted to "sol" and then "gel" state
- ☐ coatings can be obtained by spinning coating using "sol".

2- Which one of the following variables affect the final structure in the sol-gel process

- ☐ type of precursor
- ☐ pH value of the solution
- ☐ catalyst
- ☐ amount of water
- ☐ all of them

3- Choose the odd one out about hydrolysis and condensation reaction occurred during sol-gel processing.

- ☐ during hydrolysis precursor reacts with water and liberates alcohol groups
- ☐ condensation reactions are two kinds, namely, alcohol and water condensation
- ☐ M-O-M (metal-oxo bridges) is formed as a result of condensation reaction
- ☐ hydrolysis and condensation reactions lead to formation of "sol".
- ☐ hydrolysis and condensation reactions are not affected from the amount of water in the starting solution.

4- Choose the incorrect statement about catalysts?

- ☐ catalysts affect the hydrolysis and condensation reaction rates
- ☐ hydrolysis reaction is slower under acidic conditions, while it is faster under basic conditions
- ☐ acid catalysed hydrolysis result in weakly cross-linked gel (tangled spaghetti)
- ☐ basic conditions in sol-gel process causes coarser structures
- ☐ catalysts prevent the agglomeration of solid particle formed during "sol" stage

5- Electrostatic repulsion and steric hinderence are two techniques applied to prevent agglomeration of particles in sol-gel processing.....T F

6- In Aerogel production, there is no need to used supercritical drying.....T F

7- Xerogels and Aerogels can be produced after gelation stage..... T F