

Challenging Questions Exam One

Proteins carry out a number of important biological functions. Which one of the following is not one of the functions that proteins carry out that we've talked about in this course.

- a. act as enzymes catalyzing chemical transformations
- b. serve as receptors for transferring information from hormones or neurotransmitters to cells
- c. transport oxygen from the lungs to the rest of the body via the blood stream
- d. store energy for later use by the body

We have talked about hydrogen bonding playing an important role in the chemistry of the molecules of life. Which one of the following is not a role played by hydrogen bonding

- a. contributing to the the rod-like shape of cellulose
- b. contributing to the formation of alpha-helices in proteins
- c. contributing to codon anti-codon recognition in the DNA/mRNA/tRNA protein synthesis sequence
- d. contributing to the solubility of grease particles in soap

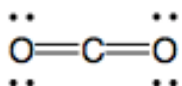
Quaternary structure is found in a number of contexts in the molecules of life, which one of the following does not involve quaternary structure.

- a. the interactions between amino acids in different protein polymer chains within the same protein
- b. forming the rods (chains) of polyglucose that stack in cellulose
- c. the ordering of amino acids in the protein polymer chain
- d. the DNA double helix with hydrogen bonding recognition elements between polynucleotide strands

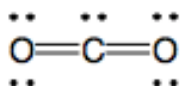
Challenging Questions Exam Two

Which one of the following is the most correct Lewis structure/diagram for carbon dioxide (CO₂)?

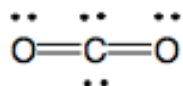
a)



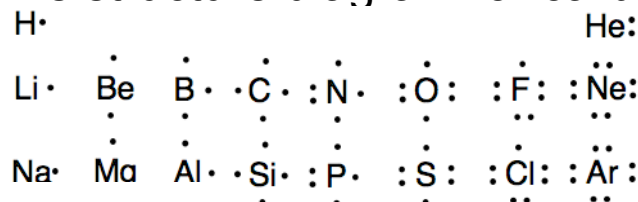
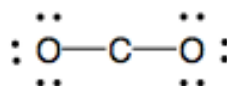
b)



c)



d)



To the nearest integer, the molar mass of SO₂ is 64.

Based on the following periodic table, there are 13 protons in an atom of Aluminum (Al).

Sulfur needs to form 2 shared pairs (bonds) to get to a noble gas configuration.

In a 3.2 M solution of Fe(ClO₄)₃, the concentration of (ClO₄)¹⁻ is 9.6 M.

Which one of the following is not a true statement about water purification.

- a) water can be desalinated by reverse osmosis
- b) water can be desalinated by distillation
- c) water can be purified by carbonation (reacting with CO₂)

Challenging Questions Exam Three

Of the energy topics we've covered this semester, which one does not impact our water supply?

- a) Solar PV
- b) nuclear power plant
- c) coal-fired power plant
- d) biofuel-derived ethanol
- e) hydraulic fracturing

Which one of the following is not a disadvantage of using wind power.

- a) we have to build the infrastructure to use it
- b) large quantities of water are used in the operation of windmill turbines
- c) windmills destroy view corridors
- d) the wind doesn't blow all the time
- e) rare earth elements such as europium are used in windmills

Challenging Questions Exam Three

In 2017 the EIA estimates that electricity from Advanced Nuclear will cost _____ /kWh

PLANT TYPE	<u>LEVELIZED</u> COST (\$/kWh)
Conventional Coal	0.0977
Advanced Coal	0.1109
Advanced Coal with CCS	0.1388
Natural Gas – Conventional Combined Cycle (CC)	0.0661
Natural Gas – Advanced CC	0.0631
Natural Gas – Advanced CC with CCS	0.0901
Natural Gas – Conventional Combustion Turbine	0.1279
Natural Gas – Advanced Combustion Turbine	0.1018
Advanced Nuclear	0.1114
Geothermal	0.0982
Biomass	0.1154
Wind	0.0960
Solar PV	0.1527
Solar Thermal	0.2420
Hydro	0.0889

- a) \$11.14
- b) 11.14 cents
- c) 1.114 cents
- d) \$1.114