

INFORMATION FOR PROSPECTIVE STUDENTS

about the structure and types of questions given as an example
of Medical School Admission Test (MSAT)

CHEMISTRY (examples)

Refer to the passage below for questions 1 through 2.

All of the possible ketopentose sugar isomers have been synthesized in a research project. The ketopentose isomers have been reduced with sodium borohydride, converting the ketone function to an alcohol.

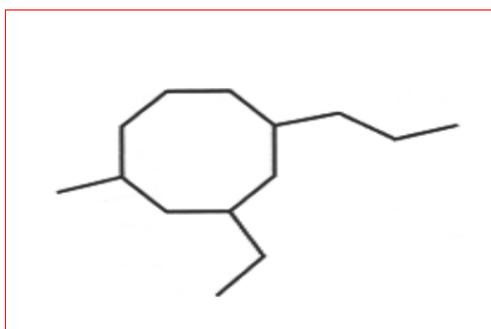
1. The total number of 2-ketopentose isomers is:

- A. two
- B. four
- C. six
- D. eight
- E. nine

2. The total number of isomers of the sugar alcohols produced by the sodium borohydride reaction is:

- A. two
- B. three
- C. four
- D. five
- E. six

3. What is the correct name for the following compound?



- A. 1-ethyl-3-methyl-7-propylcyclooctane
- B. 1-methyl-3-ethyl-5-methylcyclooctane
- C. 1-methyl-3-ethyl-5-propylcyclooctane
- D. 3-ethyl-1-methyl-5-propylcyclooctane
- E. 1-ethyl-3-methyl-7-propyloctane

4. TABLE 1 shows several types of intermolecular attractive forces and examples of clusters for which each type of force predominates. In contrast to the strengths of these intermolecular forces, the strength of a chemical bond is typically tens of thousands of times stronger.

Table 1

FORCE	STRENGTH (cm^{-1})	EXAMPLES
H-bonding	$\sim 1,200 - 2,000$	$\text{F-H} \cdots \text{F-H}$
Dipole-Dipole	$\sim 30 - 1,000$	$\text{HCl} \cdots \text{SO}_2$
Dipole-Induced Dipole	$\sim 20 - 500$	$\text{H}_2\text{O} \cdots \text{Ar}$
Dispersion	$\sim 3 - 150$	$\text{Ar} \cdots \text{Ar}$

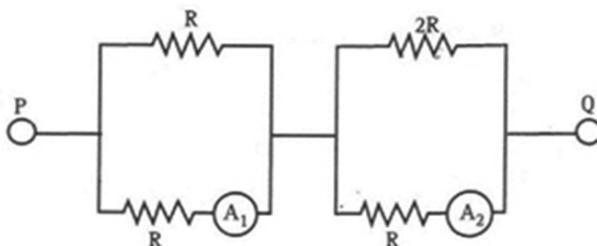
Which of the following clusters would you expect to be most strongly bound?

- A. $\text{NO} \cdots \text{Ar}$
- B. $\text{Ar} \cdots \text{Ar}$
- C. $\text{CCl}_4 \cdots \text{Ar}$
- D. $\text{HCl} \cdots \text{Ar}$
- E. $\text{Cl}_2 \cdots \text{Cl}_2$

PHYSICS (examples)

1. In the arrangement shown below, a current flows from P to Q, and the ammeter A1 reads 3.0 A. If each ammeter has negligible resistance, what is the reading on ammeter A2?

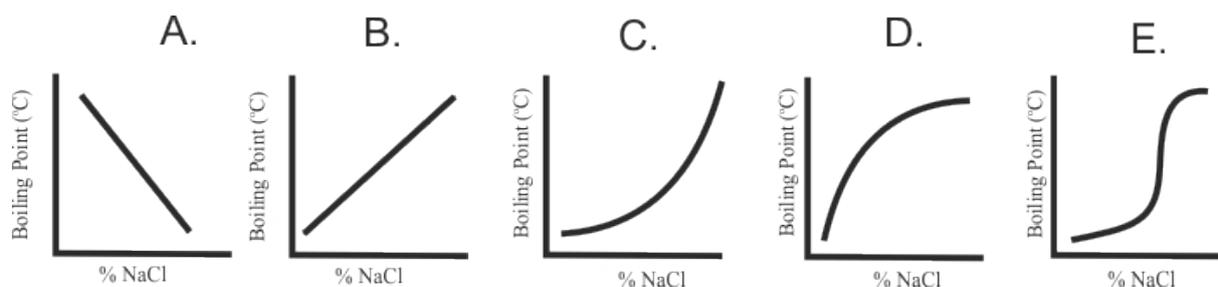
- A. 1.0 A
- B. 1.5 A
- C. 2.0 A
- D. 4.0 A
- E. 5.0 A



2. What is the ratio of the maximum possible number of f electrons to the maximum possible number of p electrons?

- A. 2:1
- B. 4:1
- C. 7:3
- D. 15:6
- E. 5:1

3. Which of the following shows the boiling point of an aqueous sodium chloride solution as a function of the percent sodium chloride in the solution by weight?



4. Based on the figure above, if a mixture of solution B and solution C boils at 40°C , what is the mole fraction of B in the vapor?

- A. 0.04 or 0.70
- B. 0.20 or 0.40
- C. 0.30 or 0.96
- D. 0.60 or 0.80
- E. 0.80 or 0.96

BIOLOGY (examples)

Refer to the passage below for questions 1 through 4.

A common disease that afflicts the digestive system is peptic ulcer disease. In humans, this condition occurs when the concentration of gastric juice overwhelms the protection provided by the mucous lining of the stomach and the neutralizing secretions of the pancreas. This acidity damages the stomach walls, causing pain, bleeding, or laceration of the digestive tract. The most frequent site of peptic ulcers is the first few centimeters of the duodenum. Parietal cells in the stomach secrete HCl. HCl secretion is stimulated by gastrin, acetylcholine (ACh), and histamine. There are two negative feedback mechanisms that regulate acid secretion. First, excess HCl in the duodenum stimulates the secretion of the hormone secretin, which increases the rate and volume at which pancreatic juice containing bicarbonate ion is secreted. Second, gastrin inhibits HCl secretion when the stomach pH reaches a certain minimum.

1. All of the following structures secrete digestive juices EXCEPT the

- A.** oral cavity.
- B.** esophagus.
- C.** stomach.
- D.** ileum.
- E.** jejunum.

2. It has recently been hypothesized that the triggering event for some ulcers is bacterial infection. If this is true, which of the following would be the most effective method to eliminate the ulcer?

- A.** Stimulate ACh release.
- B.** Inhibit the formation of formylmethionyl-tRNA, which is the initiator aminoacyl-tRNA found in prokaryotes only.
- C.** Administer puromycin, which is an aminoacyl-tRNA analog in both prokaryotes and eukaryotes.
- D.** Inject excess clotting factors to reduce bleeding.
- E.** Inject excess factors to reduce motor action of smooth muscles.

3. Based on information in the passage, which of the following is NOT a plausible cause of peptic ulcer disease?

- A. Excessive gastrin production
- B. Weakness in mucosal barriers
- C. Decrease in parietal cell sensitivity to histamine
- D. Abnormally high density of parietal cells in the stomach
- E. Excessive acetylcholine (ACh) production

4. Which of the following organs is involved in neutralizing gastric acidity?

- A. Pancreas
- B. Large intestine
- C. Stomach
- D. Liver
- E. Spleen