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chem10b 12.1-5

Which of the following is not a natural polymer?

silk
starch
protein
cellulose
nylon

| | Student Response | Correct Answer |
|----|------------------|----------------|
| A. | nylon | |
| B. | silk | |
| C. | cellulose | |
| D. | starch | |
| E. | protein | |

2.

chem10b 12.1-7

There are _____ different amino acids present in most proteins.

| | Student Response | Correct Answer | Feedback |
|----|------------------|----------------|----------|
| A. | 1 | | |
| B. | 2 | | |
| C. | 99 | | |
| D. | 16 | | |
| E. | 20 | | |

3.

chem10b 12.4-5

A plasticizer makes a polymer more pliable by reducing the interactions between polymer chains.

Student Response

Correct Answer

4.

chem10b 12.2-25

Cholesteric liquid crystals have not been used for monitoring of _____.

Student Response

Correct Answer **Feedback**

- A. skin temperature
- B. temperature of cookware
- C. all of the above
- D. hot spots in microelectronic circuits
- E. temperature of light

5.

chem10b 12.2-20

In the smectic A liquid-crystalline phase, _____.

Student Response
Feedback

Correct Answer

- A. the molecules are oriented in a totally random fashion
- B. the molecules are aligned along their long axes, with no ordering with respect to the ends of the molecules
- C. the molecules are aligned with their long axes tilted with respect to a line perpendicular to the plane in which the molecules are stacked
- D. disk-shaped molecules are aligned through a stacking of the disks in layers
- E. the molecules are arranged in sheets, with their long axes parallel and their ends aligned as well

Score: 1/1

6.

chem10b 12.2-16

Materials that eventually break down in the body _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. can be used to construct "scaffoldings" on which natural cells grow | | |
| B. can be used to construct bone-replacements | | |
| C. are always toxic | | |
| D. can be used to construct long-term replacements for heart valves | | |
| E. cannot be used as biomaterials | | |

7.

chem10b 12.2-11

Natural rubber is too soft and chemically reactive for practical applications. Vulcanization of natural rubber entails _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. increasing the average molecular weight of a condensation polymer | | |
| B. crosslinking reactive polymer chains with sulfur atoms | | |
| C. decreasing the average molecular weight of an addition polymer | | |
| D. conversion of a condensation polymer to an addition polymer | | |
| E. conversion of an addition polymer to a condensation polymer | | |

Score: 1/1

8.

chem10b 12.2-2

The material first shown to exhibit what we now call superconductivity was _____.

| Student Response | Correct Answer | Feedback |
|-------------------------|-----------------------|-----------------|
| A. a thin film | | |
| B. a ceramic | | |
| C. a metal | | |

- D. a composite
- E. a polymer

9.

chem10b 12.2-23

For a given substance that exhibits liquid-crystalline properties, the transition from solid to liquid-crystal state occurs _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. at a well defined temperature below the melting point of the solid | | |
| B. over a range of temperatures between the melting point of the solid and the boiling point of the liquid | | |
| C. over a range of temperatures that includes the melting point of the solid | | |
| D. at the melting point of the solid | | |
| E. at a well defined temperature above the melting point of the solid | | |

1.

chem10b 12.1-7

There are _____ different amino acids present in most proteins.

| Student Response | Correct Answer | Feedback |
|-------------------------|-----------------------|-----------------|
| A. 1 | | |
| B. 2 | | |
| C. 99 | | |
| D. 16 | | |
| E. 20 | | |

2.

chem10b 12.2-10

The monomer that is polymerized to make natural rubber is _____.

| Student Response | Correct Answer | Feedback |
|-------------------------|-----------------------|-----------------|
| A. adipic acid | | |
| B. formaldehyde | | |
| C. ethylene | | |
| D. isoprene | | |
| E. melamine | | |

3.**chem10b 12.2-16**

Materials that eventually break down in the body _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. can be used to construct bone-replacements | | |
| B. can be used to construct long-term replacements for heart valves | | |
| C. can be used to construct "scaffoldings" on which natural cells grow | | |
| D. cannot be used as biomaterials | | |
| E. are always toxic | | |

Score: 1/1

4.**chem10b 12.2-15**

A biomaterial intended for use as a long-term replacement of a blood vessel _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. must be rigid and chemically inert | | |
| B. must be rigid and have rough surfaces | | |
| C. should be designed such that it encourages coagulation of blood | | |
| D. must be rigid and must not degrade over time | | |
| E. must be flexible and have an open porous structure | | |

5.

chem10b 12.1-6

A category _____ plastic container will generally be the most easily recycled.

| Student Response | Correct Answer | Feedback |
|------------------|----------------|----------|
| A. 1 | | |
| B. 2 | | |
| C. 3 | | |
| D. 4 | | |
| E. 22 | | |

6.

chem10b 12.2-19

Which of the following is most likely to exhibit liquid-crystalline behavior?

| Student Response | Correct Answer | Feedback |
|---|----------------|----------|
| A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{-Na}^+$ | | |
| B. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ | | |
| C. | | |
| D. | | |
| E. $\text{CH}_3\text{CH}_2\text{-C}(\text{CH}_3)_2\text{-CH}_2\text{CH}_3$ | | |

7.

chem10b 12.2-4

A material is sintered by _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. placing in the middle | | |
| B. heating with sulfur | | |
| C. sieving to achieve uniform particle size | | |
| D. heating the finely divided solid to a high temperature under pressure | | |
| E. finely dividing the solid | | |

8.

chem10b 12.2-1

Superconductivity means that _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. super expensive materials were used | | |
| B. diamagnetic atoms become elongated | | |
| C. electrons move through a shorter path | | |
| D. electrons move faster | | |
| E. electrons move without resistance | | |

9.

chem10b 12.2-21

Cholesteric liquid crystals are colored because _____.

| Student Response | Correct Answer | Feedback |
|---|-----------------------|-----------------|
| A. each molecule is a chromophore | | |
| B. All of the molecules contain multiple benzene rings. | | |
| C. of the large number of conjugated bonds | | |
| D. of the slight twist between layers | | |
| E. of the large spacing between layers | | |

1.

chem10b 12.2-17

In the context of biopolymers, the opposite of the polymerization process is _____.

| Student Response | Correct Answer | Feedback |
|------------------|----------------|----------|
| A. sublimation | | |
| B. hydrolysis | | |
| C. addition | | |
| D. cross-linking | | |
| E. condensation | | |

2.

chem10b 12.2-14

A biomaterial intended for use as a long-term replacement of a bone must _____.

| Student Response | Correct Answer | Feedback |
|-----------------------------------|----------------|----------|
| A. not degrade over time | | |
| B. possess all of these qualities | | |
| C. not cause an immune response | | |
| D. be chemically inert | | |
| E. have sufficient rigidity | | |

3.

chem10b 12.2-5

In initial steps of the sol-gel process, a reactive metal is treated with an alcohol to form a metal alkoxide. The metal alkoxide is then combined with water to form the metal hydroxide. The metal hydroxide is not formed directly by reaction of the metal with water because _____.

| Student Response | Correct Answer | Feedback |
|------------------|----------------|----------|
|------------------|----------------|----------|

- A. the alcohol stabilizes the metal hydroxide making it less susceptible to attack by the base added later
- B. finer particles are obtained in the two-step process
- C. the two-step process prevents oxidation of the metal to an unstable oxidation state
- D. the metal hydroxide formed in the two-step process is more soluble and is more easily utilized
- E. the direct reaction of a reactive metal with water will give a complex mixture of metal oxides and hydroxide

4.

chem10b 12.1-10

Which type of liquid crystal is colored and changes color with temperature?

| Student Response | Correct Answer | Feedback |
|------------------|----------------|----------|
| A. smectic C | | |
| B. cholesteric | | |
| C. smectic B | | |
| D. nematic | | |
| E. smectic A | | |

5.

chem10b 12.2-16

Materials that eventually break down in the body _____.

| Student Response | Correct Answer | Feedback |
|--|----------------|----------|
| A. are always toxic | | |
| B. can be used to construct long-term replacements for heart valves | | |
| C. cannot be used as biomaterials | | |
| D. can be used to construct bone-replacements | | |
| E. can be used to construct "scaffoldings" on which natural cells grow | | |

Score: 1/1

6.

chem10b 12.2-24

For a given substance that exhibits liquid-crystalline properties, the liquid-crystalline state exists _____.

Student Response

Correct Answer

Feedback

- A. in a range of temperatures above the melting point of the solid
- B. in a range of temperatures below the melting point of the solid
- C. at one particular temperature above the melting point of the solid
- D. at one particular temperature below the melting point of the solid
- E. in a range of temperatures from below the melting point to above the melting point

Score: 1/1

7.

chem10b 12.1-7

There are _____ different amino acids present in most proteins.

Student Response

Correct Answer

Feedback

- A. 1
- B. 2
- C. 99
- D. 16
- E. 20

8.

chem10b 12.2-9

As a polymer becomes more crystalline, _____.

Student Response

Correct Answer

Feedback

- A. its yield stress decreases
- B. its stiffness decreases
- C. its density decreases

- D. its melting point decreases
- E. none of the above are correct

9.

chem10b 12.2-22

Molecules with only single bonds do not generally exhibit liquid-crystalline properties because _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. molecules without multiple bonds lack the flexibility necessary for alignment | | |
| B. molecules with only single bonds are gases | | |
| C. molecules without multiple bonds lack the rigidity necessary for alignment | | |
| D. molecules without multiple bonds are too small to exhibit liquid-crystalline properties | | |
| E. molecules with only single bonds are too big to exhibit liquid-crystalline properties | | |

1.

chem10b 12.2-13

Biocompatibility means that material is _____.

| Student Response | Correct Answer | Feedback |
|---------------------------------------|-----------------------|-----------------|
| A. made by biological methods | | |
| B. integratable into living organisms | | |
| C. biodegradable | | |
| D. made from biological material | | |
| E. none of the above | | |

2.

chem10b 12.1-3

Which one of the following is an addition polymer with the same structure as polyethylene except that one hydrogen on every other carbon is replaced by a benzene ring?

polyvinyl chloride
polypropylene
polystyrene
polyurethane
nylon 6,6

| Student Response | Correct Answer | Feedback |
|-------------------------|-----------------------|-----------------|
| A. polystyrene | | |
| B. polyvinyl chloride | | |
| C. polyurethane | | |
| D. nylon 6, 6 | | |
| E. polypropylene | | |

3.

chem10b 12.4-2

Superconductors exhibit the Meissner effect.

| Student Response | Correct Answer |
|-------------------------|-----------------------|
|-------------------------|-----------------------|

4.

chem10b 12.2-12

The formation of a condensation polymer generally involves _____.

| Student Response | Correct Answer | Feedback |
|--|-----------------------|-----------------|
| A. the formation of significant crosslinking | | |
| B. the vaporization of a plasticizer | | |
| C. the elimination of a small molecule | | |
| D. the mixing of sulfur with an addition polymer | | |
| E. the addition of a plasticizer | | |

5.

chem10b 12.1-6

A category _____ plastic container will generally be the most easily recycled.

| Student Response | Correct Answer | Feedback |
|------------------|----------------|----------|
| A. 1 | | |
| B. 2 | | |
| C. 3 | | |
| D. 4 | | |
| E. 22 | | |

6.

chem10b 12.1-9

A _____ liquid crystal has the least order and is the most liquid-like.

| Student Response | Correct Answer | Feedback |
|------------------|----------------|----------|
| A. cholesteric | | |
| B. nematic | | |
| C. smectic B | | |
| D. smectic C | | |
| E. smectic | | |

7.

chem10b 12.2-25

Cholesteric liquid crystals have not been used for monitoring of _____.

| Student Response | Correct Answer | Feedback |
|---------------------|----------------|----------|
| A. all of the above | | |
| B. skin temperature | | |

- C. temperature of cookware
 - D. temperature of light
 - E. hot spots in microelectronic circuits
-

8.

chem10b 12.2-18

In what year was the first systematic work involving liquid crystals reported?

| Student Response | Correct Answer | Feedback |
|-------------------------|-----------------------|-----------------|
| A. 1954 | | |
| B. 1978 | | |
| C. 1943 | | |
| D. 1888 | | |
| E. 1776 | | |

9.

chem10b 12.4-3

Polyethylene is formed by a condensation reaction.

| Student Response | Value | Correct Answer |
|-------------------------|--------------|-----------------------|
|-------------------------|--------------|-----------------------|