

Question 1

Tissue Mimicking Materials:

- Are used in clinical trials
- Are always complex systems
- Are an independent validation process in a stable, controlled and ideal environment to test current and new imaging techniques
- Are always solid materials

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- Are used in clinical trials
- Are always complex systems
- **Are an independent validation process in a stable, controlled and ideal environment to test current and new imaging techniques – Correct answer**
- Are always solid materials

Question 2

Tissue acoustic and thermal properties of tissue are:

- Independent and set
- Dependent only on disease state
- Dependent on several biological factors including age, disease state and ethnicity
- Dependent only on age

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- Dependent only on disease state
- **Dependent on several biological factors including age, disease state and ethnicity –
Correct answer**
- Dependent only on age

Explanation: Tissue mimicking properties of interest will depend on application phantom is designed for. Properties can depend on several biological factors, including age, disease state and ethnicity.

Question 3

A disadvantage of using reversible thermochromic TMMs is:

- Changes must be recorded immediately after exposure
- Setting processes must occur at low temperatures
- Only the maximum temperature reached is visible and temporal information is lost
- They are single use

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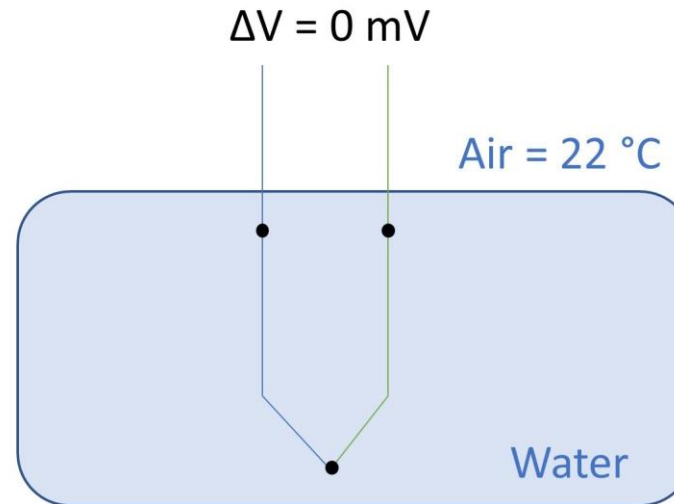
- **Changes must be recorded immediately after exposure – Correct answer**
- Setting processes must occur at low temperatures
- Only the maximum temperature reached is visible and temporal information is lost
- They are single use

Explanation: Reversible thermochromic TMMs must be evaluated immediately after the exposure that induces a heat rise as the material will return to its original temperature once the heat dissipates and the information will be lost.

Question 4

Considering the scheme bellow and the Seebeck coefficient for a Type-S thermocouple of $40 \mu\text{V}/\text{K}$, what is the water temperature?

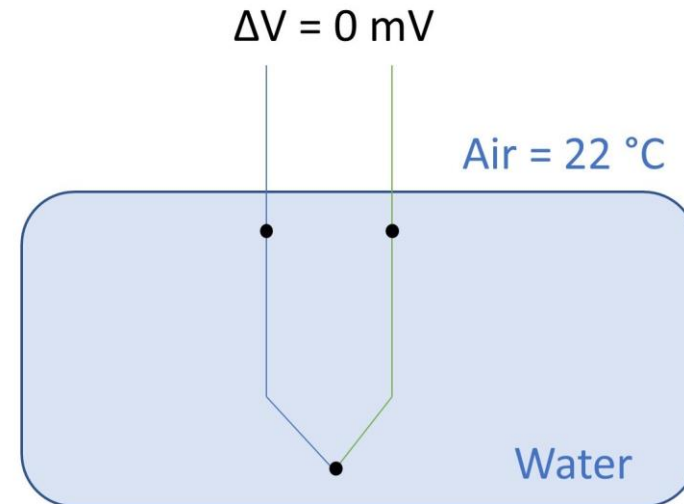
- Unknown
- $0 \text{ }^\circ\text{C}$, as $\Delta V = 0 \text{ mV}$
- $22 \text{ }^\circ\text{C}$, as $\Delta V = 0 \text{ mV}$
- $23.5 \text{ }^\circ\text{C}$, as per calculation
- $33 \text{ }^\circ\text{C}$, as per calculation



Question 4

Considering the scheme bellow and the Seebeck coefficient for a Type-S thermocouple of $40 \mu\text{V/K}$, what is the water temperature?

- **Unknown – Correct answer**
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- $22 \text{ }^\circ\text{C}$, as $\Delta V = 0 \text{ mV}$
- $23.5 \text{ }^\circ\text{C}$, as per calculation
- $33 \text{ }^\circ\text{C}$, as per calculation



Explanation: Cold and hot junctions are exposed to the same temperature (water) making it not possible to measure.

Question 5

When working on a dynamic system, where should the thermocouple be placed?

- The position is not important, due to the dynamics of the system
- The position is not important, as long as the reader is showing a positive ΔV
- The position is not very important, as long as the thermocouple is close to the heat source
- The position is very important, the thermocouple should be distant from the heat source and the controller should include the PID features
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- The position is very important, the thermocouple should be close to the heat source and the controller should includes the PID features

Question 6

When choosing a thermocouple for measurements, it is important to consider:

- The junction diameter only. If it is small, the response will be accurate and fast
- The junction diameter only. If it is big, the thermocouple positioning will be easier, and the response will be accurate
- The thermocouple type only. If the measured temperature is within the range, the type is the only important feature to consider
- The junction diameter and thermocouple type only
- None of the above

Question 6

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- The junction diameter only. As long as it is big, the thermocouple positioning will be easier, and the response will be accurate
- The thermocouple type only. As long as the measured temperature is within the range, the type is the only important feature to consider
- The junction diameter and thermocouple type only
- **None of the above – Correct answer**

Explanation: You must consider junction diameter, thermocouple type, environment conditions, response time, compatibility and other factors when choosing a thermocouple.

Question 7

What is the typical wavelength range of the electromagnetic spectrum used for infrared thermography:

- From 7.5 to 14 μm
- From 7.5 to 14 nm
- From 380 to 750 nm
- From 0.1 to 1 mm

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- From 7.5 to 14 nm
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Explanation: Thermographic cameras usually detect radiation in the long-infrared range of the electromagnetic spectrum.

Question 8

What is the maximum temperature that can be reached by a transducer assembly patient contact surface during a still-air test:

- 37 °C
- 43 °C
- 27 °C
- 50 °C

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- 37 °C
- 43 °C
- 27 °C
- **50 °C – Correct answer**

Explanation: The maximum temperature should not exceed 50 °C, or 27 °C above room temperature.

Question 9

Which of the following is a common artifact for infrared thermography:

- Emissivity correction
- Viscous heating
- Range to range correction
- Camera motion

Question 9

Which of the following is a common artifact for infrared thermography:

- **Emissivity correction – Correct answer**
- Viscous heating
- Range to range correction
- Camera motion

Explanation: If emissivity is not corrected for, the temperature of material with low values will be underestimated, sometimes significantly.