Postharvest Sample Questions

Sample Questions - Temperature Management

Draw a typical commodity cooling curve (temperature on the "y" (vertical) axis and time on the "x" (horizontal) axis) for a commodity cooled in air. Identify the initial product temperature, the air temperature, and the ½ and 7/8 cooling times.

How would you expect the cooling curve to be different if the product was cooled using water (hydrocooling) instead of air?

Where is the mass average for temperature in a round commodity (e.g. a grapefruit)?

How does package venting effect cooling and temperature maintenance?

What are the four ways that heat can be removed from a commodity and give an example of each? Explain the principals behind each.

List the four general cooling methods and discuss some advantages and disadvantages of using each? Give an example of a commodity well-suited for cooling by each method.

Postharvest Sample Questions

Sample Questions - Temperature Management

Discuss the different factors that affect the speed of air cooling?

How might one solve each of the following problems with a forced-air cooler?

1) Fruit closest to the intake fan cools faster than fruit furthest from the fan.

2) Fruit on top of the pallet cools faster than fruit on the bottom.

3) Fruit that comes in contact with the airflow first cools faster that fruit further in.

Describe how package design and packaging material (e.g. fruit wraps) affect product cooling?

What properties of water make it a good cooling medium?

Postharvest Sample Questions

Sample Questions - Temperature Management

What are some advantages and disadvantages of using a conveyer vs. a batch hydrocooler?

Product placed in a hydrocooler are taking a long time to cool. What are some factors that might be reducing the cooling rate in the hydrocooler?

What are some advantages and disadvantages of using ice to cool product? How would you decide whether or not to use hydrocooling for a new product?

Describe the difference between top icing and liquid ice injecting?

Describe how vacuum cooling cools the product?

What type of commodities are suited to vacuum cooling and why?

Postharvest Sample Questions

Sample Questions - Temperature Management

How is the problems of water loss during vacuum cooling sometimes overcome?

Why are vacuum coolers more energy efficient that other cooling methods?

A strawberry handler receives an order for a truckload of berries that must be ready to be picked up at 8:00 p.m., and cooled to at least 3°C.

a) At what time must he start cooling the berries if the pulp temperature is 33°C, the temperature of the cooling air is 1°C, and the half-cooling time of his forced-air cooler is 2 hours? Show assumptions and calculations.

b) Regarding the above scenario, is it practical for the strawberry handler to conduct his operation in that way? What are some general areas he could address to reduce the half-cooling time of his forced-air cooler? (8 points)

What theoretical advantage does ice have over liquid water as a cooling medium, and why isn't this advantage realized in practice?

Postharvest Sample Questions

Sample Questions - Temperature Management

What is the benefit obtained by wetting produce prior to vacuum cooling?

How much time would be required to cool melons from 36°C to 8°C using 4°C water in a hydrocooling system with a half-cooling time of 10 minutes? What would the temperature of the melons be after the same amount of time if the water temperature were 0°C?

Sweet corn is brought in from the field at a temperature of 34C, packed into wire-bound wooden crates and run through a hydrocooler with water at a temperature of 2C and a half-cooling time of 30 minutes.

a) How long will it take and what will the temperature be when the sweet corn is 7/8 cool?

b) What changes to this cooling system or supplemental procedures could be used to more efficiently cool the sweet corn?

Describe how the surface area to volume ratio changes with increasing size for similar shaped produce.