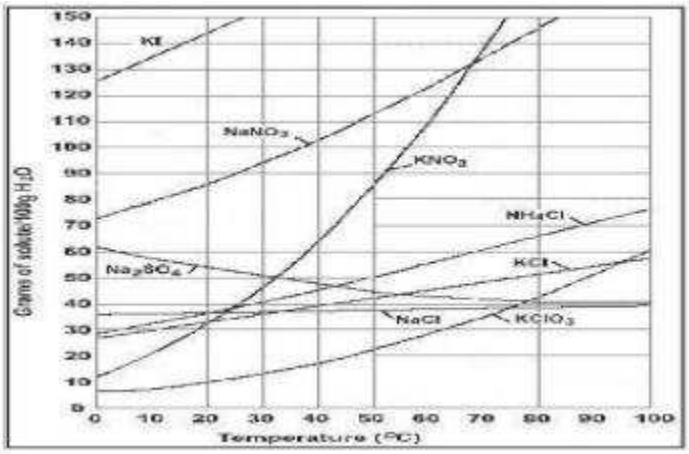
Cadet Name: _____

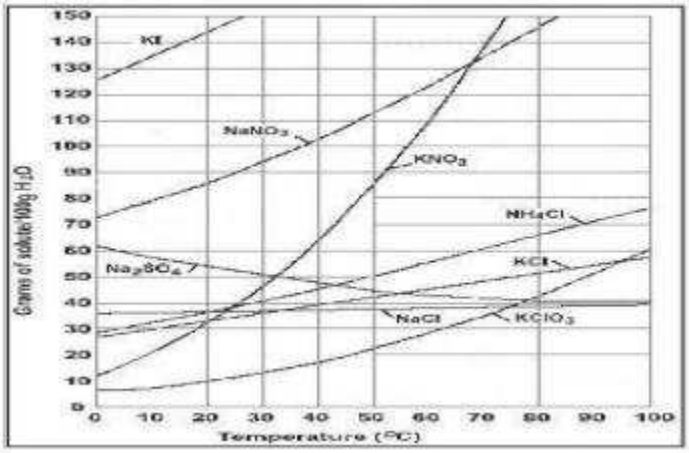
Date: _____

1. (ACTSTPT:Q1) How many grams of NH4Cl can be dissolved in 200 g of water at 70 ˚C?



A) 70
B) 90
C) 120
D) 180

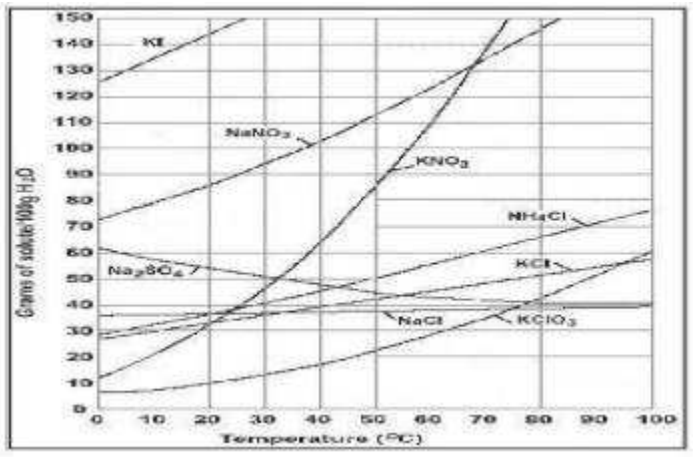
2. (ACTSTPT:Q2) As the temperature of a solution of NaNO3 is increased, what trend in its solubility is observed?



A) Decreasing solubility
B) Increasing solubility
C) No change in solubility
D) Temperature does not affect its solubility.

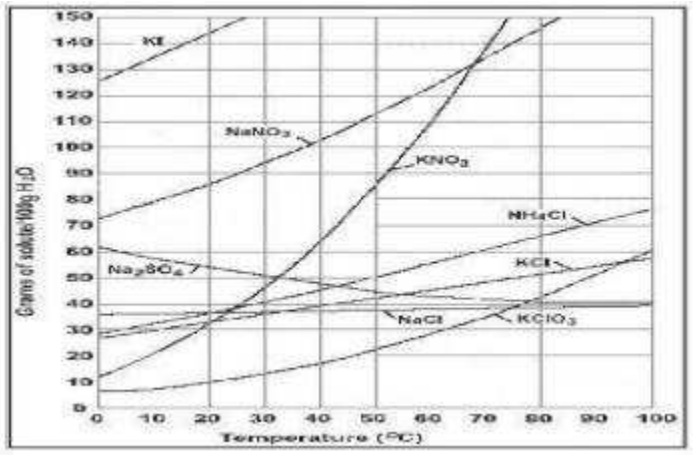
3. (ACTSTPT:Q3) At what temperature is the solubility of sodium chloride (NaCl) the same as

the solubility of
potassium chloride (KCl)?



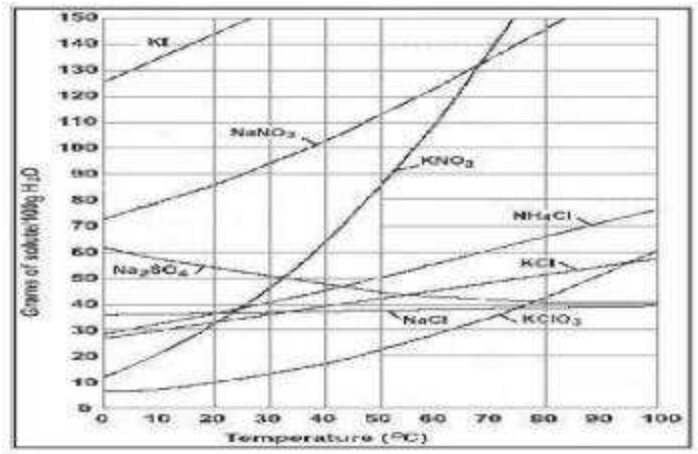
A) 22
B) 30
C) 34
D) 40

4. (ACTSTPT:Q4) What compound is least soluble at 40 ˚C?



A) NaCl
B) KCl
C) Na2SO4
D) NH4Cl

5. (ACTSTPT:Q5) Which procedure will increase the solubility of KCl in water?



A) stirring the solute and solvent mixture
B) increasing the surface area of the solute
C) raising the temperature of the solvent
D) increasing the pressure on the surface of the solvent

6. (ACTSTPT:Q6) Which of the following is not supported by the experimental results?

A) The amount of energy released when an electron drops energy levels correlates with the wavelength of the light emitted.
B) Lasers can emit only visible light.
C) Lasers can emit light in the ultraviolet, infrared, and x-ray spectral regions.
D) A photon of light can be absorbed by an atom.

7. (ACTSTPT:Q7) Energy can be directly released from all of the following EXCEPT:

A) an electron in an excited state
B) an outer electron in a higher energy state
C) an electron in its lowest energy state
D) a photon being emitted

8. (ACTSTPT:Q8) Which experiment concerns atoms or molecules initially in a lowered energy state?

A) Experiments 1 and 2
B) Experiments 2 and 3
C) Experiments 1 and 3
D) None of the experiments

9. (ACTSTPT:Q9) Which experiment(s) DO(ES) NOT require any energy to be added in order for energy to be given off?

A) Experiment 1
B) Experiment 2
C) Experiment 3
D) All of the experiments

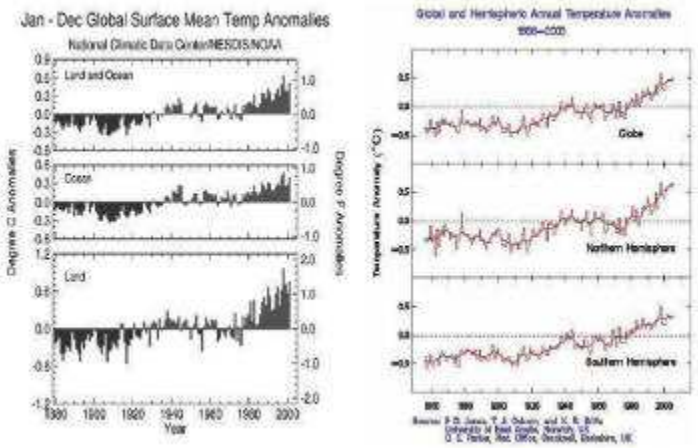
10. (ACTSTPT:Q10) What experiments offer the most promise for use in lasers (assuming the same atom or molecule)?

A) Experiments 2 and 3
B) Experiments 1 and 2
C) Experiments 1 and 3
D) Unable to determine based on information given.

11. (ACTSTPT:Q11) What is the most telling way to determine if an atom or molecule has the best potential for use in lasers?

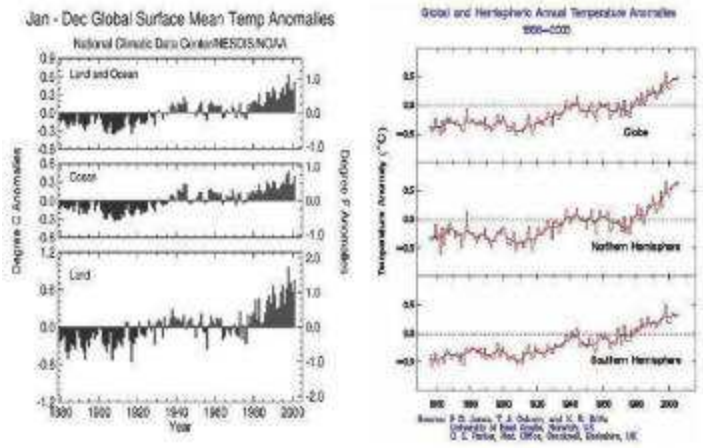
A) Measure the energy level of the initial atom or molecule.
B) Measure the energy level of its excited state.
C) Measure the amount of energy added to reach its excited state.
D) Measure the amount of energy given off after going from its excited state to a lower energy level.

12. (ACTSTPT:Q12) What overall trend, in terms of global temperature, is observed since the beginning of the 20th century?



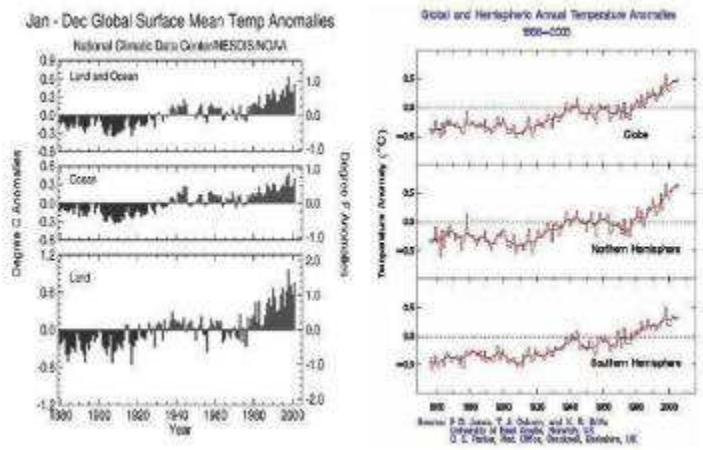
A) decreasing temperature
B) increasing temperature
C) no change
D) increasing, then decreasing temperature

13. (ACTSTPT:Q13) Which of the following statements is true based on the data in the graph?



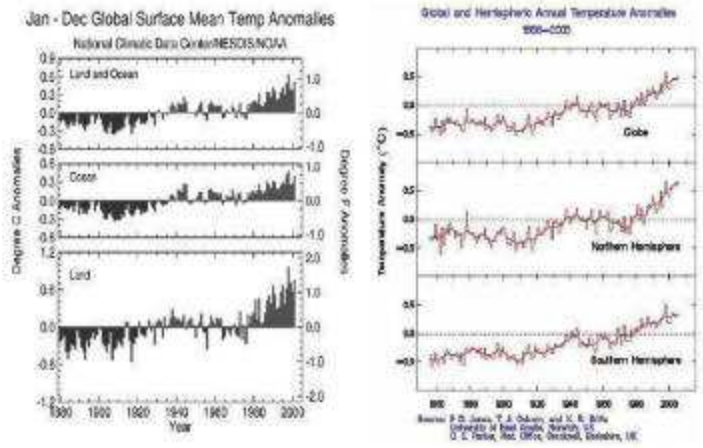
A) Ocean temperatures have greater anomalies than those observed on land.
B) Ocean temperatures have the same amount of anomalies as those observed on land.
C) Land temperatures have greater anomalies than those observed in the ocean.
D) Cannot be determined by the information given.

14. (ACTSTPT:Q14) What hypothesis best explains the reason for the observed differences in the data between the ocean and land?



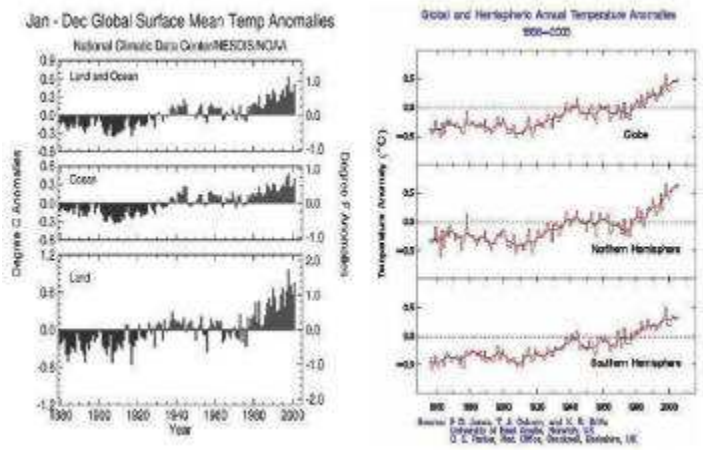
A) Land absorbs heat from the oceans.
B) Water heats up and cools down faster than land.
C) There is more ocean than land on Earth's surface.
D) Land heats up and cools down faster than water.

15. (ACTSTPT:Q15) According to the second graph, which hemisphere is experiencing the greater temperature anomalies since the 1980s?



A) Northern
B) Southern
C) Both
D) Neither

16. (ACTSTPT:Q16) Which year marks the change from negative °C anomalies to positive °C anomalies?



A) 1880
B) 1900
C) 1940
D) 2000

17. (ACTSTPT:Q17) What trend best describes the information observed for the development of fruit flies over the temperature range between 12 °C and 28 °C?

A) As the temperature increases, the development time decreases.
B) As the development time increases, the temperature decreases.
C) As the temperature increases, the development time decreases.
D) As crowding increases, the development time decreases.

18. (ACTSTPT:Q18) About how long would it take for development to occur under extremely crowded conditions at 35 °C?

A) 5 days
B) 8 days
C) 11 days
D) 18 days

19. (ACTSTPT:Q19) A female fly lays 400 eggs, and half the eggs are allowed to develop at 12 °C while the other half are subjected to extreme crowding at 25 °C. What would you expect to observe in the two groups, based on their development conditions?

A) The second group to hatch would be extremely small.
B) The first group would be normal sized.
C) The two groups would hatch at the same time.
D) The first group to hatch would be able to have offspring before the second group even hatched.

20. (ACTSTPT:Q20) If a female fly that is smaller than normal due to development under crowded conditions were to lay eggs under ideal conditions, the flies that hatch would

A) be normal sized.
B) be smaller than normal flies.
C) take 12 days to develop.
D) take 50 days to develop.

21. (ACTSTPT:Q21) A female fly lays 400 eggs. The eggs initially begin their development under ideal conditions but are forced into crowded conditions for the remainder of development. What can be said about the size of the flies?

A) The flies will be smaller.
B) The flies will be normal sized.
C) Half will be normal sized and half will be smaller.
D) There is not enough information to determine the outcome.

22. (ACTSTPT:Q22) In which experiment does humidity NOT play a factor?

A) Experiment 1
B) Experiment 3
C) Experiment 4
D) Experiment 2

23. (ACTSTPT:Q23) Which experiment tests whether light or humidity is a stronger stimulus?

A) Experiment 2
B) Experiment 4
C) Experiment 1
D) Experiment 3

24. (ACTSTPT:Q24) What should be observed if a moist paper were placed under both the plastic and paper boxes in the presence of light?

A) The isopods would aggregate under the plastic box.
B) The isopods would aggregate under the paper box.
C) The isopods will not move at all because of the high humidity.
D) The isopods will aggregate evenly between the two boxes.

25. (ACTSTPT:Q25) All of the conditions for response below are tested in the experiments EXCEPT:

A) light with no humidity difference
B) light with humidity difference
C) humidity with no light
D) dark with no humidity difference

26. (ACTSTPT:Q26) In what conditions do isopods prefer to exist?

A) low humidity and low light intensity
B) high humidity and high light intensity
C) high humidity and low light intensity
D) low humidity and high light intensity

27. (ACTSTPT:Q27) To which stimulus should the isopods have a stronger response?

A) Humidity
B) Light
C) Neither; the two elicit equivalent responses
D) More information is needed

28. (ACTSTPT:Q28) Scientist 1 mentions all of the following as possible causes of dinosaur extinction EXCEPT:

A) volcanoes
B) continental drift
C) global climate change
D) celestial bodies

29. (ACTSTPT:Q29) A major difference between the theories of Scientist 1 and Scientist 2 is that Scientist 2 believes that

A) a gradual climate change occurred, whereas Scientist 1 believes a rapid climate change occurred.
B) an extraterrestrial catastrophe caused the climate change, whereas Scientist 1 believes continental drift was the cause for numerous volcanic eruptions.
C) volcanoes are not powerful enough to cause a global climate change, whereas Scientist 1 believes that volcanoes are powerful enough.
D) the iridium can only come from an extraterrestrial source, whereas Scientist 1 believes that asteroids do not contain enough iridium to account for the amount in the K-T boundary.

30. (ACTSTPT:Q30) Which of the following, if true, could best defend Scientist 2's theory against criticism voiced by Scientist 1?

A) To date, no reliable evidence for any celestial bodies that may have crossed paths with Earth has been found.
B) The fossil record suggests that several marine species died out millions of year prior to the K-T extinction.
C) Celestial bodies, such as asteroids, contain higher concentrations of iridium than are present in the Earth's mantle.
D) Strong evidence exists for a series of volcanic eruptions during the K-T extinction.

31. (ACTSTPT:Q31) Which discovery would support the hypothesis of Scientist 1?

A) The presence of iridium was part of an unrelated phenomenom.
B) Mass extinction occurred gradually over several million years.
C) The K-T boundary was found to have millions of Deccan traps throughout various parts of the world.
D) A massive crater was discovered recently on the Yucatan Peninsula in Mexico.

32. (ACTSTPT:Q32) Both scientists agree that what was the underlying cause of the extinction of the dinosaurs?

A) A massive asteroid collided with the Earth, killing all the dinosaurs.
B) A massive climate change resulted in the extinction of the dinosaurs.
C) Volcanic eruptions resulted in the death of the dinosaurs.
D) Iridium was the cause for the massive extinction.

33. (ACTSTPT:Q33) The following statement supports which Scientist's theory?
"The marine fossil record does support a slightly rapid decline, while the terrestrial record (especially in North America) strongly suggests a more gradual decline…."

A) Scientist 1
B) Scientist 2
C) Both
D) Neither

34. (ACTSTPT:Q34) What data below could ultimately provide the best information to prove or disprove one of the arguments?

A) a more detailed astronomical history
B) a more detailed fossil history
C) an accurate mapping of continental drift
D) all of the above

35. (ACTSTPT:Q35) What information can be learned from Experiment 2?

A) Heavy rain directly influences the signal.
B) The periodicity was independent of the position of the sensor.

C) The periodicity is directly related to the position of the sensor.
D) The signal is independent of all outside factors.

36. (ACTSTPT:Q36) It is well known that water-saturated soil restricts the exchange of gases between soil and the atmosphere. Thus, when soil gas is not being released under these conditions, observed radiation counts are reduced. Which experiment(s) would this information support?

A) Experiment 1
B) Experiment 2
C) Experiment 3
D) Experiments 2 and 3

37. (ACTSTPT:Q37) The goal of which experiment was to answer each of the initially posed questions during its design?

A) Experiment 2
B) Experiment 1
C) Experiment 3
D) None

38. (ACTSTPT:Q38) Which of the three experiments would be considered the control?

A) Experiment 1
B) Experiment 2
C) Experiment 3
D) There is no control

39. (ACTSTPT:Q39) The sensor was placed in a hole that was wet from rain. The soil then dried over the duration of the measurements. What result should be expected?

A) exactly the same as previously observed
B) a signal showing a gradual recovery to periodicity
C) a signal similar to that observed in Experiment 2
D) a signal similar to that observed in Experiment 1

40. (ACTSTPT:Q40) What conclusion can be made based on the experiments?

A) Periodicity observed in radiation counts is due to radon emissions from soils.
B) Periodicity observed in radiation count is due to other gas emissions from soils.
C) Radon emissions do not display a periodic cycle of 24 hours.
D) The experiments failed to answer the initially posed questions.

[Answer Key]
1. C
2. B
3. C
4. A
5. C

6. B
7. C
8. C
9. B
10. D
11. D
12. B
13. C
14. D
15. A
16. C
17. A
18. D
19. D
20. A
21. D
22. C
23. D
24. B
25. D
26. C
27. B
28. D
29. B
30. C
31. C
32. B
33. A
34. D
35. C
36. C
37. B
38. A
39. B
40. A