

Name: _____

AGRONOMY 354
Test 3
March 25, 2009

INDICATE THE ONE BEST RESPONSE.

1. Approximately how long does it normally take to decompose one-half of the organic matter contained in crop residues disked into an Iowa soil in April?
a) 5-10 days b) 3-6 weeks c) 2-4 months d) 1-2 years
2. An acre-furrow slice of most soils contains thousands of pounds of calcium because:
a) most Al horizons contain free CaCO_3 .
b) calcium compounds do not leach.
c) several different minerals contain calcium and release it as they weather.
d) Ca is precipitated from the atmosphere into most soils.
3. Soils with a pH of 8.8 would most likely be classified as:
a) saline. b) calcareous. c) acid. d) saline sodic. e) sodic.
4. A soil test report calls for 6,000 lbs of ECCE for a 6-inch depth but you wish only to mix the lime into the surface 4 inches. How much lime is required in pounds?
a) 6000 b) $2/3 \times 6000$ c) $3/2 \times 6000$ d) $6/7 \times 6000$ e) $7/6 \times 6000$
5. With which ratio of Ca to Mg on exchange sites would one want to be sure to add dolomite as a liming agent?
a) 10:1 b) 1:1 c) be safe, always use dolomite d) either calcite or dolomite is always fine
6. The thiocyanate method can be used in tropical countries to estimate:
a) lime requirement. b) soil active acidity.
c) Mg deficiencies. d) luxury consumption.
e) Ca deficiencies.
7. The material with a CCE of 109 is (Ca=40, Mg=24, C=12, O=16, H=1):
a) CaCO_3 . b) $\text{CaMg}(\text{CO}_3)_2$. c) MgCO_3 . d) $\text{Ca}(\text{OH})_2$. e) none of these.
8. As discussed in your reading (also in lecture), grass tetany is a result of:
a) low soil pH and Al toxicity of the vegetation.
b) high soil pH and Ca toxicity of the vegetation.
c) low S in the vegetation.
d) high % base saturation of the vegetation.
e) low Mg in the vegetation.
9. Acid (1 M HCl) is added to soil and it effervesces. The likely pH of the soil is near:
a) 6.0. b) 7.0. c) 8.0. d) 9.0.
10. Of the nutrients listed, interveinal chlorosis is associated with a deficiency of:
a) Ca. b) P. c) Mg. d) K. e) N.
11. If the pH of a soil is 5.4, then its pOH is expected to be _____.
a) 5.4 b) 7.0 c) 7.6 d) 8.6 e) 10.4

12. As we looked at the type structure of humic acid in lecture, we observed all but:
- very common bonds throughout the structure.
 - aromatic ring components.
 - N in ring structures.
 - metal ions bonding to adjacent active sites.
 - peptides in linkage structures.
13. Soil organic matter is significant for:
- soil structure.
 - soil cation exchange capacity.
 - microbial energy source.
 - more than one of these.
 - all of these.
14. This material is most popular among floriculturists for acidulating soil for acid-loving ornamentals.
- CaSO_4
 - $(\text{NH}_4)_2\text{SO}_4$
 - CaCl_2
 - elemental S
 - $\text{Al}_2(\text{SO}_4)_3$
15. One should avoid watering house plants with water that has passed a water softener because a _____ soil will likely develop.
- acidic
 - sodic
 - saline
 - P deficient
 - high lime
16. If a limestone has 63% ECCE (effective calcium carbonate equivalent) and the Iowa State soil test report recommendation is for 4000 lbs of 100% ECCE, how many pounds of limestone are needed?
- 6349
 - 2520
 - 5750
 - 5231
 - none of these
17. Plants contain chelated Ca^{2+} in:
- chlorophyll.
 - EDTA.
 - pectates.
 - proteins.
 - cellulose.
18. Severe erosion in western Iowa (8 to 12 inches) usually:
- decreases the need of the remaining soil for lime.
 - has no effect on the lime needs.
 - increases the need of the remaining soil for lime.
 - can result in any of the above.
19. Your reading talks about the main growth-limiting factor in many acidic soils (pH <5.0 to 5.5) to be:
- N deficiency.
 - Ca deficiency.
 - H^+ toxicity.
 - Mg deficiency.
 - Al toxicity.
20. The determination of whether or not a soil is saline is made by:
- surface soil appearance.
 - electrical conductivity of saturated paste.
 - soil pH.
 - determination of specific ions on the CEC sites.
 - plant growth in the soil.
21. The most desirable pH of acid soils in regions of heavy rainfall may be less than the pH 6.5 recommended for Iowa soils. Which one of these factors is not a reasonable explanation?
- high leaching losses of micronutrients
 - different costs of lime
 - less soluble H^+ in solution at a given pH in regions of heavy rainfall
 - different clay mineralogy
22. Which of these materials will react in soil most quickly?
- marl
 - calcitic limestone
 - slaked lime
 - dolomitic limestone
 - basic slag

23. Which of these best describes a saline soil?
- a) high in sodium, called "black alkali," and pH is less than 8.5.
 - b) has a white crust at soil surface between rains, pH is less than 8.5, and electrical conductivity is 4 or more dS/m.
 - c) high in salt, surface is often yellowish, and electrical conductivity is 2 or less dS/m.
 - d) none of these describe a saline soil.

POSSIBLE POINTS ARE INDICATED IN THE LEFT-HAND COLUMN.

24. Concerning a sodic soil,
a) how would you recommend that it be reclaimed?
(3)

- b) why is it so difficult to reclaim?
(3)

25. Indicate to a U of I graduate why Iowa soil organic matter levels have decline since the virgin soils were brought into cultivation.
(6)

26. Laboratory tests determine your soil pH is 5.7. Tissue analyses of plants growing in the soil indicate that Ca and Mg levels are adequate. What material would you use to increase the pH to 6.5. Why did you choose this material?

(4)

27. An industrial process generates MgSO_4 and the company wants to sell it as a soil amendment. Do you think it will increase or decrease soil pH. Explain.

(4)

28. You wish to reduce soil pH and a soil analysis indicates it will take 3 meq acidity/100g soil. How many pounds per acre would you recommend if elemental S were used? (At wt S = 32) Please show your work.

(4)

Part 1 _____

Part 2 _____

Total _____