Soil Science Reviewer Based On TOS

Module C: Chemical Properties of Soils | By Agriculture Review

Review Questions (1 - 10)

1. During a field inspection, a corn crop exhibits pronounced V-shaped yellowing starting from the tips of the older leaves and progressing down the midribs. Which specific physiological condition best explains this field observation?

a) Failure of the plant to translocate immobile phosphorus from older tissues to new vegetative growth

b) Inability of the root system to absorb sufficient mobile nitrate ions, leading to the relocation of this element from older to newer leaves

c) Excessive accumulation of potassium in the leaf margins causing localized necrosis and eventual leaf senescence

d) Restricted uptake of sulfur from the soil solution leading to general chlorosis of the entire crop canopy

2. A farmer planted corn early in the spring when soils were exceptionally cold and wet. The young plants soon developed a distinct purple coloration along the margins of the lower leaves. What is the primary mechanism causing this specific element to fail to enter the plant roots at sufficient levels?

a) Cold temperatures significantly reduce the rate of diffusion and root proliferation, limiting interception of this highly immobile element

b) Excess moisture causes rapid leaching of the nutrient beyond the active root zone before the roots can absorb it

c) Anaerobic conditions promote the reduction of this element into a volatile gas that escapes into the atmosphere

d) Low soil temperatures induce competitive inhibition by calcium ions at the root uptake sites

3. In a continuous corn production system, plants display yellowing followed by necrosis (firing) strictly along the outer edges of the lower leaves, while the midribs remain green. If soil moisture is adequate, what soil condition most likely restricted this element from entering the roots?

a) Severe soil compaction reducing oxygen availability, which is critical for the active metabolic transport of this element

b) High microbial population immobilizing the nutrient during the decomposition of carbon-rich crop residues

c) Extreme soil acidity leading to aluminum toxicity that specifically blocks the mass flow of this nutrient

d) The presence of a high water table causing the complete dissolution and subsequent volatilization of the element

4. Agricultural development relies heavily on optimizing macro elements to sustain crop production. Which statement best assesses the essentiality of supplying macro fertilizers in an intensive agricultural country?

a) They are required in trace amounts purely to act as catalysts for enzymatic reactions in high-yielding varieties

b) They replace the massive quantities of structural and functional nutrients removed during harvest to prevent rapid soil degradation

c) They primarily serve to increase the soil cation exchange capacity to hold more water during drought periods

d) They are utilized to permanently alter the soil textural class, making it more favorable for mechanized farming

5. A diagnostic soil test reveals that a corn field has a pH of 8.2 and high free calcium carbonate. The newly emerging leaves exhibit severe interveinal chlorosis, while the veins remain distinctly green. Which micro element failed to enter the plant roots, and why?

a) Manganese, because high pH causes it to leach rapidly out of the root zone

b) Zinc, because calcareous conditions promote its conversion into a gaseous form

c) Iron, because high pH causes it to precipitate as highly insoluble hydroxides and oxides

d) Boron, because excess calcium actively replaces it inside the plant chloroplasts

6. Which of the following scenarios best demonstrates how nitrogen fails to enter the roots of a corn plant during a period of prolonged flooding?

a) Denitrifying bacteria convert available nitrates into nitrogen gas under anaerobic conditions, removing the source from the soil solution

b) Flooding increases soil oxygen, causing nitrates to oxidize into highly toxic nitrites that roots actively repel

c) Excess water causes nitrogen to bind tightly to silicate clay surfaces, rendering it permanently unavailable

d) The flooded conditions lower the soil pH dramatically, causing aluminum to precipitate all available nitrogen

7. In determining the essentiality of micro elements for crop production, how does their physiological role compare to that of macro elements?

a) Micro elements are only necessary for disease resistance, while macro elements are responsible for actual biomass accumulation

b) Micro elements are entirely optional for native crops but strictly required for hybrid commercial varieties

c) Micro elements are equally essential for the completion of the plant life cycle, acting primarily as enzyme activators rather than structural components

d) Micro elements can substitute for macro elements when the latter are depleted from the soil profile

8. A farmer applies massive amounts of raw, uncomposted rice straw (high C:N ratio) to a field prior to planting corn. The crop soon shows severe generalized yellowing of older leaves. What biological process prevented the fertilizer macro elements from entering the plant roots?

a) Ammonification by macro-organisms causing toxic root burn

b) Microbial immobilization, where soil microbes outcompete plant roots for available nitrogen to break down the carbon

c) Nitrification inhibition by allelopathic chemicals released from the fresh straw

d) Denitrification triggered by the excessive carbon acting as a physical barrier to oxygen diffusion

9. Which specific mechanism explains how soil pH affects the availability of phosphorus in a highly weathered, acidic tropical soil (pH 4.5)?

a) Phosphorus volatilizes into phosphine gas under strongly acidic conditions

b) Soluble aluminum and iron react with phosphate ions to form highly insoluble complexes, restricting root uptake

c) High hydrogen ion concentration directly strips phosphorus from the internal transport tissues of the plant roots

d) Acidic conditions hyper-stimulate mycorrhizal fungi, which consume all available phosphorus for their own structural growth

10. An agronomist is evaluating liming materials for a field with a pH of 5.0 and a severe magnesium deficiency. Which factor should dictate the choice of the liming material to address both the acidity and the nutrient imbalance simultaneously?

a) Selecting a material with the highest possible Calcium Carbonate Equivalent (CCE) regardless of mineral composition

b) Choosing calcitic limestone due to its rapid dissolution rate in heavily degraded soils

c) Applying dolomitic limestone to neutralize exchangeable acidity while supplying essential magnesium ions

d) Utilizing basic slag to provide a slow-release form of pure calcium oxide

11. When assessing the essentiality of fertilizers, the concept of 'hidden hunger' refers to a specific phase in crop development. How is this phase characterized in terms of macro element nutrition?

a) The plant shows severe visual deficiency symptoms but continues to yield normally

b) The nutrient concentration is below the critical level and yield is reduced, but no visual deficiency symptoms are apparent

c) The plant absorbs excess nutrients beyond its physiological needs, causing toxicity without visual markers

d) The root system physically rejects fertilizers due to a localized drop in soil pH

12. Corn plants in a highly alkaline soil exhibit shortened internodes and broad bands of bleached tissue on either side of the leaf midrib (white bud). What micro element is deficient, and how does the pH affect its availability?

a) Copper; high pH causes it to volatilize rapidly

b) Zinc; high pH promotes its strong adsorption to calcium carbonate and clay surfaces

c) Molybdenum; high pH converts it into an insoluble oxide form

d) Chlorine; high pH leaches it entirely from the soil profile

13. Which of the following factors is most critical to evaluate when determining the actual speed at which a selected liming material will react to neutralize soil acidity?

a) The bulk density of the liming material

b) The moisture content of the liming material during storage

c) The fineness factor or particle size distribution of the ground limestone

d) The specific heat capacity of the calcium carbonate crystals

14. A farmer attempts to correct soil acidity using quicklime (CaO). While highly effective, what is a primary agronomic risk associated with evaluating this choice of liming material?

a) It is extremely slow to react, requiring several years to alter the soil pH

b) It contains high levels of heavy metals that poison soil macro-organisms

c) It is highly caustic, difficult to handle, and can cause a rapid, extreme spike in pH that induces micro element deficiencies

d) It leaves an acidic residue after the initial reaction, ultimately lowering the pH further

15. Demonstrate how soil macro-organisms, specifically earthworms, directly affect crop production and nutrient availability in a continuous cropping system.

a) They compete aggressively with plant roots for water, causing widespread drought stress

b) They ingest organic matter and mineral soil, excreting casts that possess higher cation exchange capacity and greater nutrient availability than the surrounding bulk soil

c) They exude powerful acids that instantly drop soil pH, making phosphorus permanently unavailable

d) They selectively consume nitrifying bacteria, completely halting the conversion of ammonium to nitrate

16. How do soil micro-organisms, specifically symbiotic Rhizobium bacteria, play a role in producing 'biological organic fertilizers' for agricultural ecosystems?

a) By breaking down rocks to release trapped mineral phosphorus directly into the xylem of host plants

b) By converting atmospheric nitrogen gas into plant-usable ammonia inside the root nodules of leguminous crops

c) By synthesizing completely artificial humic acids that mimic synthetic urea fertilizers

d) By actively transporting heavy metals away from the root zone to prevent toxicity in highly acidic soils

17. A crop consultant recommends applying a chelated foliar spray rather than a soil-applied granular fertilizer to correct a micro element deficiency in a pH 8.0 soil. Why does the conventional soil-applied micro element fail to enter the plant roots in this environment?

a) The micro element rapidly converts into a gas at high pH and dissipates before root interception

b) Alkaline conditions stimulate massive microbial blooms that physically block root pores

c) The high concentration of hydroxyl ions rapidly precipitates the applied micro element into unavailable solid forms

d) The root epidermis thickens aggressively in alkaline soils, repelling all metallic cations

18. Assess the importance of incorporating macro element fertilizers based on the principle of the 'Law of the Minimum' for an agricultural country striving for food security.

a) Yield is determined only by the total aggregate amount of all fertilizers applied, regardless of the ratio

b) Crop production is restricted by the specific essential macro element that is in the shortest supply relative to the plant's needs

c) Applying the cheapest macro element in massive surplus will compensate for deficiencies in other expensive elements

d) Agricultural growth relies solely on maximizing nitrogen, as other elements naturally regenerate from atmospheric deposition

19. When evaluating liming materials, what is the significance of the Calcium Carbonate Equivalent (CCE)?

a) It measures the physical hardness of the limestone rock before grinding

b) It quantifies the exact amount of pure calcium an agronomist can expect a crop to absorb

c) It indicates the acid-neutralizing capacity of the material expressed as a weight percentage of pure calcium carbonate

d) It represents the exact volume of water required to completely dissolve one ton of the lime

20. Demonstrate how the micro-organism group Actinomycetes affects crop production through its specific role in organic fertilizer synthesis.

a) They are the primary fixers of atmospheric carbon dioxide, converting it directly into simple sugars for root exudation

b) They specialize in degrading complex, highly resistant organic compounds like cellulose, chitin, and lignin during the later stages of composting

c) They parasitize plant roots to form nodules that exclusively fix sulfur from the soil air

d) They rapidly convert nitrates back into nitrogen gas, acting as a natural brake on excessive crop vegetative growth

21. A clay soil and a sandy soil both have an initial pH of 5.2. An agronomist calculates that the clay soil requires three times more liming material than the sandy soil to reach a target pH of 6.5. What chemical property explains this difference?

a) Sandy soils have a higher base saturation, making them naturally resistant to alkaline inputs

b) Clay soils possess a much higher buffering capacity due to extensive reserve acidity held on exchange sites

c) Clay soils harbor micro-organisms that actively consume the calcium carbonate before it can react

d) Sandy soils exhibit higher active acidity in the soil solution, requiring less chemical effort to neutralize

22. Which of the following describes the most severe consequence of 'overliming' an inherently acidic sandy soil to a pH above 7.5?

a) Induction of severe macro element toxicities, particularly massive surges in available phosphorus

b) Complete destruction of the soil's organic matter content through spontaneous chemical combustion

c) Precipitation and subsequent widespread deficiency of essential micro elements like iron, manganese, and zinc

d) Immediate conversion of all exchangeable calcium into highly toxic elemental calcium gas

23. In the context of the production of organic fertilizers, how do soil macro-organisms like millipedes and woodlice facilitate the biochemical work of micro-organisms?

a) By chemically synthesizing enzymes that only micro-organisms can utilize for respiration

b) By physically shredding and fragmenting raw plant debris, vastly increasing the surface area available for microbial colonization and decomposition

c) By actively hunting and consuming pathogenic fungi, leaving only beneficial bacteria in the compost pile

d) By generating intense internal body heat that pasteurizes the surrounding soil environment

24. A corn plant exhibits severely stunted, thick, and brown-tipped roots with very few fine root hairs. The soil test reveals a pH of 4.2. Which specific toxic ion, mobilized by the low pH, is directly causing this root damage and restricting macro element uptake?

a) Molybdenum

b) Calcium

c) Aluminum

d) Boron

25. Evaluate the essentiality of supplying the micro element Molybdenum to a field of soybeans. What is its critical physiological function that affects crop production?

a) It provides structural rigidity to the stem, preventing lodging under heavy wind conditions

b) It acts as a primary component of the nitrogenase enzyme required by symbiotic bacteria for nitrogen fixation

c) It physically replaces calcium in the middle lamella during cell division

d) It dictates the opening and closing of stomata, regulating water use efficiency

26. How does the application of organic fertilizers (like compost) help mitigate sudden fluctuations in soil pH, thereby protecting nutrient availability?

a) By coating the soil particles in a waterproof lipid layer that prevents chemical reactions

b) By providing weak organic acids and their salts which act as an excellent chemical buffer system in the soil solution

c) By permanently binding to all hydrogen ions and physically removing them from the field via volatilization

d) By replacing all clay particles with inert carbon matrices that do not interact with soil water

27. A farmer intends to use wood ashes as a liming material. While evaluating this choice, what unique characteristic must be considered regarding its effect on macro elements?

a) Wood ash provides substantial amounts of potassium along with its acid-neutralizing calcium carbonates

b) Wood ash is highly concentrated in nitrogen and will cause excessive vegetative growth if applied heavily

c) Wood ash acts purely as an acidifier and will significantly lower the soil pH while providing phosphorus

d) Wood ash contains purely elemental carbon and has zero effect on either pH or macro element nutrition

28. Demonstrate the mechanism by which excessive rainfall and prolonged leaching cause a soil to become highly acidic, thus affecting macro element availability.

a) Rainwater naturally contains high concentrations of pure sulfuric acid that permanently destroys clay lattices

b) Basic cations like Ca, Mg, and K are washed away and replaced on the exchange complex by acid-forming hydrogen and aluminum ions

c) Leaching removes all soil organic matter, leaving behind purely acidic quartz sand

d) Excess water causes plant roots to excrete massive amounts of hydrochloric acid to survive

29. In crop production, proper composting is essential for high-quality organic fertilizer. If a compost pile made largely of sawdust emits a strong foul odor and fails to heat up, how are the micro-organisms affecting the process?

a) The micro-organisms are hyper-active and are consuming the material too fast, causing cold combustion

b) The extreme excess of carbon (high C:N ratio) severely limits microbial populations, stalling decomposition, while anaerobic bacteria dominate the wet pockets

c) The micro-organisms are synthesizing excessive amounts of pure nitrogen gas, cooling the pile rapidly

d) Actinomycetes have completely sterilized the pile by over-producing natural antibiotics

30. Which of the following is a primary reason potassium fails to enter plant roots in sufficient levels during a severe drought?

a) Potassium ions permanently convert into an inert gas when soil moisture drops below the permanent wilting point

b) The lack of soil water severely restricts the process of diffusion, which is the primary mechanism for potassium movement to the roots

c) Drought induces plants to reverse their nutrient flow, actively pumping stored potassium out into the dry soil

d) Dry conditions cause potassium to spontaneously fuse with nitrogen to form unavailable crystals

31. Demonstrate how the essential micro element Boron primarily affects the reproductive success of an agricultural crop.

a) It provides the dark green pigment necessary for capturing late-season sunlight

b) It is absolutely critical for pollen tube growth and germination, directly impacting seed set and yield

c) It acts as a physical shield around the ovary, protecting it from fungal pathogens

d) It regulates the uptake of water into the fruit, preventing premature bursting

32. When evaluating factors in the choice of liming materials, why might an agronomist avoid recommending marl for a highly mechanized, precision-agriculture operation despite its neutralizing value?

a) Marl contains high levels of radioactive isotopes that accumulate in the crop

b) Marl is usually mined wet, varies wildly in moisture content and purity, making precise calibration and uniform spreading extremely difficult

c) Marl reacts violently with synthetic nitrogen fertilizers, causing spontaneous combustion in the spreader

d) Marl instantly permanently seals the soil surface, completely preventing water infiltration

33. A soil profile has a pH of 5.5. A farmer applies heavy doses of ammonium sulfate fertilizer over several seasons. How will this specific practice affect the soil pH and subsequent availability of essential elements?

a) It will dramatically raise the pH, inducing iron and manganese deficiencies

b) It will buffer the soil at exactly 5.5 permanently, optimizing all nutrient uptake

c) It will accelerate soil acidification through the release of hydrogen ions during nitrification, eventually inducing aluminum toxicity and phosphorus fixation

d) It will cause the precipitation of all exchangeable calcium, turning the soil completely sodic

34. Which micro element is unique because it is required in slightly larger amounts by leguminous crops than non-legumes, due specifically to its role in the nodules?

a) Chlorine

b) Cobalt

c) Zinc

d) Boron

35. Assess the role of vesicular-arbuscular mycorrhizae (VAM) in optimizing the chemical properties of soils for crop production.

a) They act as pathogenic parasites that strip the host plant of all its accumulated nitrogen

b) They exude organic acids and significantly extend the root system's physical reach, effectively mining deeply fixed phosphorus from the soil matrix

c) They physically wrap around soil aggregates, completely isolating them from water to prevent leaching

d) They permanently alter the soil pH to 8.5 to favor their own spore reproduction

36. A corn plant exhibits the classic visual symptom of phosphorus deficiency (purpling). Beyond the visual cue, how does the failure of phosphorus to enter the plant roots fundamentally hinder the plant's internal growth mechanisms?

a) The plant loses the ability to close its stomata, leading to rapid desiccation

b) Energy transfer reactions are severely disrupted because the plant cannot synthesize adequate ATP

c) The plant cannot synthesize lignin, resulting in extremely weak, lodging-prone stalks

d) Nitrogen fixation in the corn's root nodules ceases completely

37. When evaluating the chemical composition of soils, what is the significance of the ratio of basic cations (Ca, Mg, K, Na) to total cation exchange capacity (CEC)?

a) It defines the soil's bulk density

b) It represents the base saturation percentage, which is heavily correlated with soil pH and general nutrient availability

c) It dictates the absolute rate of water percolation through the subsoil

d) It determines the total amount of sand and silt present in the soil horizon

38. Which specific action demonstrates the role of soil micro-organisms in preventing the loss of mobile macro elements from the agricultural ecosystem?

a) Microbes convert highly mobile nitrates into gaseous nitrogen to safely store it in the atmosphere

b) Through immobilization, microbes absorb inorganic nitrogen into their biomass during the decay of organic matter, preventing it from leaching away until they die and mineralize

c) Micro-organisms synthesize physical bio-films that waterproof the soil surface, stopping all drainage

d) Bacteria rapidly push mobile nutrients deep into the bedrock, out of the reach of groundwater flow

39. An extension worker is explaining the essentiality of fertilizers. How does the macro element potassium fundamentally differ from nitrogen and phosphorus in its structural role within the corn plant?

a) Potassium is the primary building block of cell walls, while N and P are only found in sap

b) Potassium does not form integral parts of plant structural components like proteins or nucleic acids; it exists primarily as a mobile ion regulating osmotic pressure and enzyme activation

c) Potassium is only required during the seedling stage, whereas N and P are needed exclusively during grain fill

d) Potassium is fixed directly from the air by the leaves, whereas N and P must come from the soil

40. Evaluate the use of 'fluid lime' (a suspension of finely ground limestone in water) versus standard dry agricultural limestone. What is the primary agronomic advantage influencing its choice?

a) It provides a much longer, multi-decade residual effect on soil pH than dry lime

b) It contains significantly more pure calcium per ton than pure dry calcium carbonate

c) It allows for highly uniform application, immediate soil contact, and a faster neutralization reaction, though it provides less residual longevity

d) It chemically converts into a macro element fertilizer upon contact with the soil air

41. A farmer observes that older corn leaves are yellowing, but the symptoms do not strictly form a V-shape. Instead, the yellowing is general, and the plants are stunted with thin, spindly stalks. The field has a history of high rainfall and light, sandy soils. What element failed to enter the roots, and why?

a) Phosphorus, due to immediate fixation by calcium

b) Sulfur, because sulfate ions are highly mobile and easily leached from sandy soils under heavy rainfall

c) Potassium, due to severe compaction blocking diffusion

d) Zinc, due to the light sandy soils causing spontaneous volatilization

42. Demonstrate the critical role of the micro element Copper in crop production and why its deficiency leads to increased susceptibility to fungal diseases and lodging.

a) Copper acts as a direct poison to all soil-borne fungi before they touch the plant

b) Copper is essential for the enzymatic synthesis of lignin, which provides physical strength and a mechanical barrier in cell walls

c) Copper dramatically increases the soil pH, creating a sterile environment around the roots

d) Copper chemically binds with nitrogen to form a rigid external armor on the plant stalk

43. Why is the determination of the soil's 'Buffer pH' necessary when evaluating factors to consider in the choice and amount of liming materials?

a) Active acidity (water pH) only measures the hydrogen in solution, while buffer pH accounts for the reserve acidity on the exchange complex to calculate the actual lime requirement

b) Buffer pH simply measures the exact amount of moisture present in the lime material itself

c) Buffer pH identifies the specific types of micro-organisms present in the soil prior to application

d) Active acidity measures base saturation, whereas buffer pH measures only aluminum toxicity

44. In the production of organic fertilizers, a farmer adds a large volume of poultry manure to a compost pile. What specific chemical property of poultry manure makes it highly reactive and potentially detrimental if applied directly to young crops without proper stabilization?

a) It contains massive amounts of complex lignin that completely stops all microbial activity

b) It possesses an extremely low pH that immediately induces severe aluminum toxicity upon application

c) It is exceptionally rich in uric acid and readily available ammonium, which can cause severe root burn and ammonia volatilization

d) It is entirely devoid of macro elements, acting only as an inert physical filler

45. A corn plant requires substantial nitrogen, which mostly enters the root via mass flow. Under what specific environmental condition will this mechanism fail most severely, even if soil nitrogen levels are adequate?

a) High atmospheric humidity combined with completely dry soil, stopping the transpiration stream that pulls water and dissolved nitrates to the root

b) Cool night temperatures that trigger the excessive opening of stomata

c) Excessive soil calcium levels that physically block the mass flow pathway

d) High soil organic matter content completely absorbing the water before it reaches the root

46. Evaluate the essentiality of Manganese in crop production. Which internal plant process is most acutely affected when this micro element fails to enter the roots?

a) The physical formation of root nodules for nitrogen fixation

b) The splitting of water molecules (photolysis) during the light reactions of photosynthesis

c) The transportation of synthesized sugars from the leaves down to the grain

d) The synthesis of cuticular wax to prevent excessive water loss

47. Which of the following organic fertilizers, heavily dependent on specific soil macro-organisms for its production, is prized for containing highly active humic acids and plant growth hormones?

a) Raw swine effluent

b) Vermicompost (earthworm castings)

c) Urea-formaldehyde

d) Calcined clay

48. Demonstrate the effect of incorporating a green manure crop (e.g., Mucuna pruriens) on the chemical composition of soils compared to applying synthetic nitrogen fertilizer.

a) Green manure permanently destroys the soil structure but provides a highly precise dose of pure ammonium nitrate

b) Green manure rapidly decreases the soil organic carbon pool while supplying nitrogen

c) Green manure slowly releases nitrogen through microbial mineralization while simultaneously increasing soil organic matter and cation exchange capacity

d) Green manure instantly neutralizes all soil acidity, replacing the need for agricultural limestone entirely

49. An agronomist notes that a high-yielding hybrid corn variety exhibits severe potassium deficiency symptoms (margin firing) on a soil test that shows 'Adequate' potassium levels. What soil condition likely caused this apparent contradiction?

a) The soil is dominated by 2:1 expanding clays (like vermiculite or illite) that trap and 'fix' the potassium between their layers, making it temporarily unavailable to the roots

b) The high organic matter in the soil aggressively repels potassium ions, pushing them into the atmosphere

c) The hybrid variety has lost the genetic ability to utilize mass flow, relying purely on root interception

d) Excessive soil temperatures caused the potassium to crystallize into inert feldspar minerals overnight

50. When assessing the essentiality of fertilizers, why is the optimal soil pH range for agricultural crop production generally cited as 6.0 to 7.0?

a) It is the exact pH where all soil micro-organisms are entirely dormant, preventing nutrient consumption

b) It represents a compromise zone where the precipitation of phosphorus by Al/Fe (at low pH) and Ca (at high pH) is minimized, and both macro and micro elements are reasonably available

c) It is the only pH range where applied limestone completely dissolves into pure calcium gas

d) It forces the plant roots to exude maximum acid, thereby physically dissolving the surrounding bedrock

Detailed Answer Key (1 - 50)

Q1: **b**	Q2: **a**	Q3: **a**	Q4: **b**	Q5: **c**
Q6: **a**	Q7: **c**	Q8: **b**	Q9: **b**	Q10: **c**
Q11: **b**	Q12: **b**	Q13: **c**	Q14: **c**	Q15: **b**
Q16: **b**	Q17: **c**	Q18: **b**	Q19: **c**	Q20: **b**
Q21: **b**	Q22: **c**	Q23: **b**	Q24: **c**	Q25: **b**
Q26: **b**	Q27: **a**	Q28: **b**	Q29: **b**	Q30: **b**
Q31: **b**	Q32: **b**	Q33: **c**	Q34: **b**	Q35: **b**
Q36: **b**	Q37: **b**	Q38: **b**	Q39: **b**	Q40: **c**
Q41: **b**	Q42: **b**	Q43: **a**	Q44: **c**	Q45: **a**
Q46: **b**	Q47: **b**	Q48: **c**	Q49: **a**	Q50: **b**

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