

Arithmetic Reasoning



Questions

Instruction

Question: Helium effuses through a pinhole 5.33 times faster than an unknown gas. That gas is most likely:
A: CO₂ B: CH₄
C: C₅H₁₂ D: C₈H₁₈

Logical Reasoning

Instruction

Question: F, G, J, K, I and M apply for a position. If interview G, interview J. If interview J, interview L. F was interviewed. F won't be interviewed unless K does. K won't be interviewed unless M does. Which of the followings might be true?
A: Only F, J and M were interviewed.
B: Only F, J and K were interviewed.
C: Only G and another candidate were interviewed.
D: Only G and three other candidates were interviewed.

Algorithmic Reasoning

Instruction

```
def expectation_number(scores):  
    """Recruitment has begun and a total of n  
    candidates have been selected. Alice and Bob  
    are responsible for reviewing the candidates  
    .....  
    Calculate the expected value of X.  
    """
```



CoT Answers

Solution

Step 1: Recall Graham's law of effusion ...
Step 2: Calculate the molar masses of helium and the unknown gas ...
Step 3: The molar mass of each candidate gas:
- CO₂ has a molar mass of 44 g/mol.
Step 4: Calculate the rate ratios for each candidate gas compared to helium ...
- Choice A: $\sqrt{4/44} \approx 0.316$
.....
Solution: Choice A

Solution

Step 1: If F was interviewed, then K must have been interviewed since F will not be hired unless K is interviewed.
.....
Step 3: Since M was interviewed, this means that at least four candidates (F, K, M, and one more) were interviewed.
.....
Solution: Choice D

Solution

```
def expectation_number(scores):  
    """Calculates E(X), the expected number of  
    resumes that appear at the same position in A and  
    B's review order."""  
    .....  
    for i, score in enumerate(scores):  
        .....  
        # Probability a resume of this score value  
        # appears at same position i is 1 / k!  
        p = 1 / factorial(k)
```



Error Analysis

Analysis

Error Step: Step 4
Error Reason: The ratio should be the square root of unknown gas over helium based on the Graham's law of effusion.
Correction: "Choice A: $\sqrt{44/4} \approx 3.32$ "

Analysis

Error Step: Step 3
Error Reason: If M is interviewed, it does not imply F and K are interviewed.
Correction: "There could be three possible interview combinations of candidates F, K and M, which are (M), (K, M) or (F, K, M)."

Analysis

Error Step: Line 16
Error Reason: The probability of a resume of a score appears at position i should be 1/k instead of 1/k!
Correction: "p = 1 / k"