PHB Education

Government Exam and D. Pharm Exit Exam Preparation Questions Bank

Subject: Pharmaceutical Chemistry

Chapter -1 (B) : Sources and types of errors

SECTION A: SOURCES AND TYPES OF ERRORS (1–40)

1–20: General Concepts of Errors

1. An **error** in analysis refers to —
   a) A blunder
   b) The difference between observed and true value
   c) Incorrect observation
   d) Instrumental failure
   Answer: b
2. The **true value** of a quantity is —
   a) Always known
   b) Theoretical value obtained by perfect measurement
   c) Measured value
   d) Average of values
   Answer: b
3. Which of the following types of errors can be corrected by calibration?
   a) Random error
   b) Systematic error
   c) Personal error
   d) Gross error
   Answer: b
4. Errors that occur due to carelessness of the observer are called —
   a) Instrumental error
   b) Personal error
   c) Random error
   d) Constant error
   Answer: b
5. Systematic errors are —
   a) Constant and reproducible
   b) Random and unpredictable
   c) Temporary
   d) Due to chance only
   Answer: a

6. Random errors are caused by —
   a) Human mistakes
   b) Fluctuations in experimental conditions
   c) Instrumental defects
   d) Calibration mistakes
   Answer: b
7. Gross errors arise from —
   a) Human blunders
   b) Calibration defects
   c) Temperature changes
   d) Statistical variation
   Answer: a
8. A **systematic error** can be detected by —
   a) Repeating experiment
   b) Comparing with standard method
   c) Using random trials
   d) Changing sample size
   Answer: b
9. A **positive error** occurs when —
   a) Observed value is less than true value
   b) Observed value is more than true value
   c) True value is unknown
   d) Instrument fails
   Answer: b
10. A **negative error** occurs when —
   a) Observed value < true value
   b) Observed value > true value
   c) Both are equal
   d) True value unknown
   Answer: a
11. Instrumental errors are due to —
   a) Defective calibration
   b) Observer's eyesight
   c) Environmental changes
   d) None
   Answer: a

12. Random errors follow —

a) Normal distribution

b) Constant value

c) Linear pattern

d) Exponential curve

Answer: a

13. Repeated observations help to —

a) Detect random errors

b) Detect gross errors

c) Avoid systematic errors

d) Eliminate all errors

Answer: a

14. The **mean** of repeated measurements reduces —

a) Random error effect

b) Systematic error effect

c) Gross error effect

d) None of these

Answer: a

15. Which type of error can be eliminated completely?

a) Random

b) Systematic

c) Gross

d) None

Answer: d

16. Personal errors arise from —

a) Judgmental mistakes

b) Poor instruments

c) Temperature variation

d) Standard deviation

Answer: a

17. Example of instrumental error is —

a) Improper zero adjustment

b) Parallax error

c) Reading error

d) Calculation mistake

Answer: a

18. Environmental errors are caused by —
    a) Humidity, temperature, pressure
    b) Improper calibration
    c) Parallax error
    d) Calculation mistake
    Answer: a
19. Reducing instrumental errors can be achieved by —
    a) Calibration
    b) Standardization
    c) Proper maintenance
    d) All of these
    Answer: d
20. Reproducibility of results mainly reduces —
    a) Systematic errors
    b) Random errors
    c) Human errors
    d) Instrumental errors
    Answer: b

21–40: Classification and Examples of Errors

21. Which of the following is NOT a source of error?
    a) Environment
    b) Human
    c) Machine
    d) Equation
    Answer: d
22. Blunders are —
    a) Large, avoidable errors
    b) Systematic
    c) Constant
    d) Due to chance
    Answer: a
23. Systematic errors can be divided into —
    a) Constant and variable
    b) Personal, instrumental, and environmental
    c) Random and gross

d) Predictable and unpredictable

Answer: b

24. Temperature change causes —

a) Environmental error

b) Random error

c) Personal error

d) None

Answer: a

25. A random error can be minimized by —

a) Averaging multiple readings

b) Calibrating instruments

c) Adjusting zero

d) Avoiding parallax

Answer: a

26. Personal errors can be avoided by —

a) Proper training

b) Using automation

c) Taking multiple readings

d) All of these

Answer: d

27. A systematic error always produces —

a) Unpredictable variation

b) Constant deviation in one direction

c) Random pattern

d) None

Answer: b

28. The sum of all possible errors gives —

a) Total error

b) Gross error

c) Mean error

d) Relative error

Answer: a

29. The ratio of absolute error to true value is called —

a) Relative error

b) Mean deviation

c) Standard error

d) Precision

Answer: a

30. When the error is proportional to measured quantity, it is called —

a) Constant error

b) Proportional error

c) Random error

d) Gross error

Answer: b

31. The difference between the average of several measurements and the true value is —

a) Absolute error

b) Systematic error

c) Mean error

d) Precision error

Answer: b

32. If the instrument has zero error, the type is —

a) Systematic

b) Random

c) Gross

d) Environmental

Answer: a

33. A high degree of scatter in readings indicates —

a) High precision

b) Low precision

c) High accuracy

d) No error

Answer: b

34. A single faulty measurement usually causes —

a) Gross error

b) Random error

c) Environmental error

d) Systematic error

Answer: a

35. Personal error example:

a) Parallax error

b) Calibration drift

c) Temperature variation

d) Fluctuation in current

Answer: a

36. Statistical analysis of results helps in identifying —

a) Random errors

b) Instrumental errors

c) Personal errors

d) None

Answer: a

37. The mean deviation measures —

a) Random error magnitude

b) Systematic deviation

c) True value

d) Accuracy

Answer: a

38. The **standard deviation** gives —

a) Precision

b) Accuracy

c) Systematic error

d) Mean

Answer: a

39. To improve accuracy, we must —

a) Eliminate systematic errors

b) Reduce random errors

c) Both a and b

d) None

Answer: c

40. When all readings are close to each other but away from the true value —

a) Accurate but not precise

b) Precise but not accurate

c) Both accurate and precise

d) Neither

Answer: b

SECTION B: ACCURACY AND PRECISION (41–70)

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41. **Accuracy** means —
    a) Closeness to true value
    b) Repeatability
    c) Reproducibility
    d) Stability
    Answer: a
42. **Precision** means —
    a) Closeness between measurements
    b) Closeness to true value
    c) Correctness
    d) Random variation
    Answer: a
43. Accuracy depends mainly on —
    a) Systematic error
    b) Random error
    c) Gross error
    d) None
    Answer: a
44. Precision depends mainly on —
    a) Random errors
    b) Systematic errors
    c) Personal errors
    d) None
    Answer: a
45. If repeated measurements give similar results, it indicates —
    a) High precision
    b) Low accuracy
    c) High accuracy
    d) Both
    Answer: a
46. Accuracy can be improved by —
    a) Calibration
    b) Training observer
    c) Using standard references
    d) All of these
    Answer: d

47. Precision can be improved by —

a) Maintaining stable conditions

b) Repetition

c) Using sensitive instruments

d) All of these

Answer: d

48. A measurement can be precise but not accurate if —

a) Systematic error exists

b) Random error is zero

c) True value is unknown

d) Instrument is perfect

Answer: a

49. The standard deviation measures —

a) Precision

b) Accuracy

c) True value

d) Systematic error

Answer: a

50. Relative standard deviation (RSD) indicates —

a) % Precision

b) % Accuracy

c) % Error

d) None

Answer: a

51. High accuracy and precision means —

a) Reliable results

b) Unreliable results

c) Inconsistent data

d) None

Answer: a

52. Precision is also known as —

a) Repeatability

b) Accuracy

c) Reproducibility

d) Reliability

Answer: a

53. Reproducibility refers to —
    a) Similar results under different conditions
    b) Same results under same conditions
    c) Different values each time
    d) None
    Answer: a
54. If standard deviation = 0, precision is —
    a) Infinite
    b) Perfect
    c) Zero
    d) Undefined
    Answer: b
55. High accuracy with low precision indicates —
    a) Average result is correct but scattered readings
    b) All readings near each other
    c) Random error is small
    d) Systematic error is zero
    Answer: a
56. Accuracy can be checked using —
    a) Certified reference materials
    b) Calibration standards
    c) Control samples
    d) All of these
    Answer: d
57. In analytical chemistry, **reliability** means —
    a) High accuracy and precision both
    b) High precision only
    c) High accuracy only
    d) Reproducibility only
    Answer: a
58. The smaller the error, the higher the —
    a) Accuracy
    b) Randomness
    c) Uncertainty
    d) Deviation
    Answer: a

59. Accuracy is affected by —

a) Systematic errors

b) Gross errors

c) Both

d) None

Answer: c

60. Precision is affected by —

a) Random error

b) Gross error

c) Environmental change

d) All

Answer: a

61. Calibration of instruments increases —

a) Accuracy

b) Randomness

c) Precision only

d) None

Answer: a

62. Using a digital balance instead of an analog one improves —

a) Precision

b) Accuracy

c) Both

d) None

Answer: c

63. Average deviation helps in measuring —

a) Precision

b) Accuracy

c) Systematic error

d) Gross error

Answer: a

64. A result close to the true value indicates —

a) High accuracy

b) High precision

c) High deviation

d) Low accuracy

Answer: a

65. Precision is evaluated using —

a) Standard deviation

b) Average deviation

c) Coefficient of variation

d) All

Answer: d

66. Accuracy test uses —

a) Recovery studies

b) Replicates

c) Statistical analysis

d) None

Answer: a

67. If the mean of measured values equals the true value —

a) Perfectly accurate

b) Perfectly precise

c) Both accurate and precise

d) None

Answer: a

68. Random variation affects —

a) Precision

b) Accuracy

c) Systematic error

d) None

Answer: a

69. A high coefficient of variation (CV) means —

a) Poor precision

b) Good precision

c) High accuracy

d) None

Answer: a

70. The least precise instrument among these is —

a) Digital balance (0.0001 g)

b) Triple beam balance (0.01 g)

c) Vernier caliper (0.001 cm)

d) Analytical balance (0.00001 g)

Answer: b

SECTION C: SIGNIFICANT FIGURES (71–90)

71. Significant figures indicate —
    a) Reliability of measurement
    b) Units of measure
    c) Instrument brand
    d) Randomness
    Answer: a
72. In the number 0.00452, how many significant figures are there?
    a) 2
    b) 3
    c) 4
    d) 5
    Answer: b
73. In 5400 (without a decimal), the number of significant figures is —
    a) 2
    b) 3
    c) 4
    d) 1
    Answer: a
74. In 5400. (with a decimal), the number of significant figures is —
    a) 2
    b) 4
    c) 3
    d) 1
    Answer: b
75. Zeros between nonzero digits are —
    a) Significant
    b) Not significant
    c) Ignored
    d) Conditional
    Answer: a
76. Leading zeros before a decimal number are —
    a) Not significant
    b) Significant
    c) Conditional

d) None

Answer: a

77. Trailing zeros after a decimal point are —

a) Significant

b) Not significant

c) Ignored

d) Random

Answer: a

78. In 0.050, how many significant figures are present?

a) 1

b) 2

c) 3

d) 4

Answer: b

79. In 2.3050, the significant figures are —

a) 3

b) 4

c) 5

d) 2

Answer: c

80. The rule for addition and subtraction:

a) Least number of decimal places

b) Least number of significant figures

c) Most decimal places

d) Average decimals

Answer: a

81. The rule for multiplication/division:

a) Least significant figures

b) Least decimals

c) Highest decimals

d) None

Answer: a

82. The number 1.000 has —

a) 1 significant figure

b) 4 significant figures

c) 3

d) 2

Answer: b

83. Round 2.546 to three significant figures —

a) 2.55

b) 2.54

c) 2.5

d) 2.6

Answer: a

84. In 7.008, zeros are —

a) Significant

b) Non-significant

c) Random

d) Ignored

Answer: a

85. 0.00230 has how many significant figures?

a) 2

b) 3

c) 4

d) 5

Answer: b

86. In 4000, trailing zeros are significant only if —

a) Decimal is present

b) Measured value given

c) Both

d) None

Answer: a

87. Significant figures in 100.0 are —

a) 1

b) 3

c) 4

d) 2

Answer: c

88. Scientific notation helps in —

a) Maintaining significant figures

b) Reducing rounding errors

c) Representing large/small numbers

d) All

Answer: d

89. When converting units, significant figures —

a) Do not change

b) Increase

c) Decrease

d) None

Answer: a

90. In 0.01020, the zeros after 2 are —

a) Significant

b) Not significant

c) Conditional

d) Ignored

Answer: a