ToxGenie Trend Analysis Report

Report Date: 2026-06-29 13:12:04

Study Title:	In Vitro Mammalian Chromosomal Aberration Test
Analysis Method:	Linear Contrast F-test for TA 98

Study No.:	Test-135	**Test Material:**	Test Chemicals
Exposure Time:	24-hours	**Test Medium:**	Not Applicable

Table 1. Raw Data Summary for TA 98

(Unit: mg/kg)

Dose	1	2	3
Negative Control	24	28	22
100	27	30	25
250	35	38	32
500	52	48	55
1000	85	78	82

Step 1. Outlier Detection (Data QA/QC) Analysis

No statistical outliers were detected in the raw data based on Tukey's fences.

*Tukey's fences: Values outside Q1 - 1.5*IQR or Q3 + 1.5*IQR (IQR method).*

Step 2. Descriptive Statistics

Table 2. Descriptive Statistics for TA 98

(Unit: mg/kg)

Dose	N	Mean	SD	SE	CV (%)	Median
Negative Control	3	24.66667	3.05505	1.76383	12.38534	24.00000
100	3	27.33333	2.51661	1.45297	9.20712	27.00000
250	3	35.00000	3.00000	1.73205	8.57143	35.00000
500	3	51.66667	3.51188	2.02759	6.79720	52.00000
1000	3	81.66667	3.51188	2.02759	4.30027	82.00000

Abbreviations & Explanations:

- N: Number of replicates.

- Mean: Average response value.

- SD: Standard Deviation of the mean.

- SE: Standard Error of the mean.

- CV (%): Coefficient of Variation.

- Median: 50th percentile of observed values.

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Step 3. Statistical Assumptions & Trend Analysis Method Selection

Table 3. Shapiro-Wilk's test for normality on the TA 98.

Dose	Statistic	P-value	Result
Negative Control	0.96429	0.63689	Normal Distribution
100	0.98684	0.78044	Normal Distribution
250	1.00000	1.00000	Normal Distribution
500	0.99324	0.84283	Normal Distribution
1000	0.99324	0.84283	Normal Distribution

P>0.05 indicates Normal Distribution.

Final decision: The TA 98 data follows a normal distribution.

Table 4. Levene's test for homogeneity on the TA 98.

Statistic	P-value	Result
0.06481	0.99105	Equal Variances

P>0.05 indicates Equal Variances.

Final decision: The TA 98 data shows equal variances.

Selected Method: Linear Contrast F-test

Rationale: The data satisfied the statistical assumptions of Normality (Shapiro-Wilk test) and Homoscedasticity (Levene's test). Therefore, the parametric Linear Contrast F-test was applied to evaluate the monotonic trend (OECD GD 54, Annex 3).

Step 4. Trend Test Statistics & Final Conclusion

Table 5. Detailed Statistics for Linear Contrast F-test

Parameter	Value
Total Sample Size (N)	15
Number of Groups (k)	5
Degrees of Freedom (Within)	10
Contrast Coefficients (c)	[-2.00, -1.00, 0.00, 1.00, 2.00]
Linear Contrast of Means (L)	138.3333
Standard Error of Contrast	5.7349
Mean Square Error (MSE)	9.8667
F-Statistic	581.8412
t-Statistic	24.1214
One-sided P-Value	0.0000

Interpretation Guide & Abbreviations:

- N: Total observations, k: Number of dose groups including control.

- c: Contrast coefficients used to test for a monotonic linear trend.

- L: Linear contrast representing the slope of the response means across doses.

- MSE: Pooled variance (Mean Square Error) within groups.

- F-Statistic / t-Statistic: Calculated test statistics for monotonic trend.

- P-value < 0.05 indicates a statistically significant monotonic dose-response trend.

- P-value >= 0.05 indicates no significant trend was detected.

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A highly significant POSITIVE dose-response trend was detected (One-sided P-Value = 0.0000).

Conclusion: The response systematically increases in a dose-dependent manner. This statistically supports the biological activity or toxicity of the test substance at increasing doses.

Step 5. Dose-Response Trend Graph (Bar with OLS Regression Line)

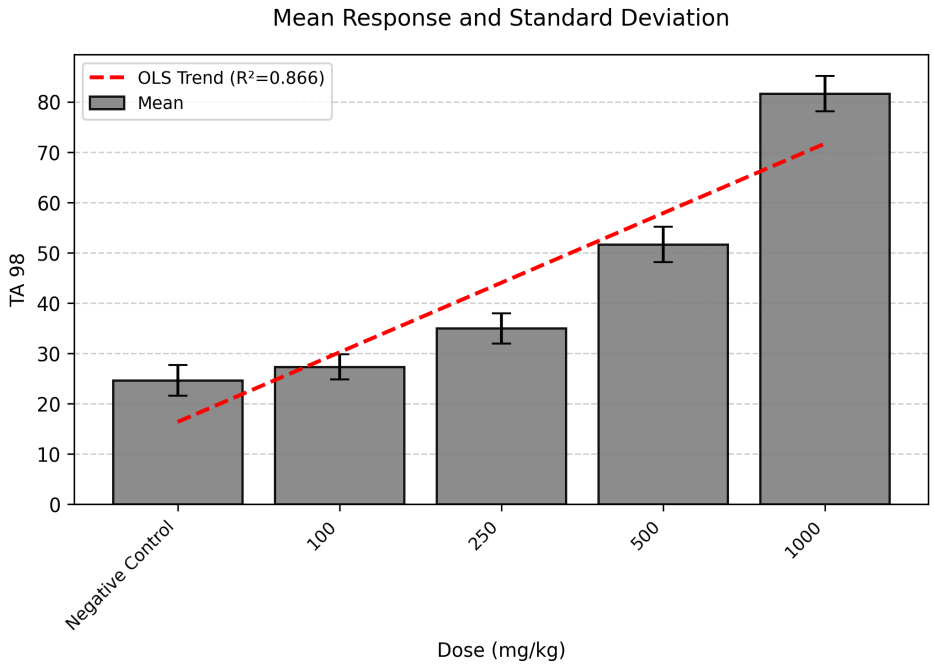

Figure 1. Dose-response trend for TA 98. Bars represent the mean and Standard Deviation (SD). The red dashed line indicates the OLS (Ordinary Least Squares) regression trend, visualizing the systematic relationship used in trend analysis.

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