

Guidelines/Criteria	
	Reference: Roloff BD, Belluck DA, Meisner LF. 1992. Cytogenetic studies of herbicide interactions in vitro and in vivo using atrazine and linuron. Arch Environ Contam 22:267-271.
<i>In vitro</i> Study Type Route of Administration Species & age of animals	<i>In vitro</i> cytogenetics with human lymphocytes
Study Duration	72hrs
Type of Mixture Binary >2 components Similar acting or dissimilar What Mode of Action was investigated?	Yes No Dissimilar None specifically
Parameters/End points Measured Target organs/Critical effects Pharmacological changes or adverse effects <i>In vitro</i>	Chromatid breaks, quadriradials, chromosome breaks and chromosome exchange, which were also summarised as break frequency and % aberrant cells. Also mitotic index.
Individual Components Characterisation of individual compounds Name, exact chemical name, CAS no. Were dose responses established for individual components? Were no effect levels established? Were doses below the NO(A)ELs investigated?	Atrazine and linuron No Yes No
Mixtures Investigated Number of dose levels How does the mixture make-up compare to individual components? (e.g. low dose) equivalents used?) No. of technical replicates per exposure condition (<i>in vitro</i>) No. of animals per dose group (<i>in vivo</i>)	1 Each component was tested at a single dose (resulting in a NOEL), whilst the mixture was tested with each component present at half of its NOEL. None, but lymphocytes from 5 or 6 different people were tested.
Observations/Findings	Two different solvent systems were compared. For both solvent systems there was no statistically significant effect of either atrazine or linuron alone (1 ug/ml and 0.001 ug/ml respectively), but the combination increased break frequency and aberrant cells. Authors report previous study showing NOEL of 0.01 for chromosome breakage caused by atrazine. For one of the solvent systems there was an increase in chromosome aberrations caused by linuron compared to the other solvent system, though the solvents alone were comparable. Considered by authors to be a possible interaction between test compound and solvent.
Overall opinion (e.g. sufficient numbers of groups investigated, group sizes adequate, observations reproducible, low dose levels used investigated)	Two technical replicates is the guideline requirement, and was at the time. DMSO is the usual solvent, and the isooctane results suggest that isooctane is having some effect, so the DMSO results are the most reliable. The lack of effect of single components and effect of the mixture is fairly convincing, but would be more so if repeated. Lack of dose response hamper interpretation of this surprising result. An <i>in vivo</i> study reported in the same paper is not relevant as each component alone caused an effect at the one dose tested.