Radiolabeled thymidine table

Primary application	Compound	Specific activity	Radiochemical concentration (mCi/mL)	Packaging buffer	Storage temperature	Notes	Catalog number
DNA proliferation	Thymidine, [methyl-^{14}C]	40-60 mCi/mmol	0.1	Steri-packaged, aqueous solution	5 °C		NEC568
		50-62 mCi/mmol	0.05	Steri-packaged, aqueous solution	5 °C		NEC568D
	Thymidine, [methyl-^{3}H]	2 Ci/mmol	1	Steri-packaged, aqueous solution	5 °C	Recommend use within one month of receipt	NET027A
		6.7 Ci/mmol	1	Steri-packaged, aqueous solution	5 °C	Recommend use within one month of receipt	NET027
		20 Ci/mmol	1	Steri-packaged, aqueous solution	5 °C	Recommend use within one month of receipt	NET027X
		20 Ci/mmol	1	70% ethanol	-20°C		NET027E
		23-27 Ci/mmol	1	10% ethanol	5 °C		NET027L
		40-60 Ci/mmol	1	2% ethanol	5 °C		NET027W
		70-90 Ci/mmol	1	Steri-packaged, aqueous solution	5 °C	Recommend use within one month of receipt	NET027Z
		100-130 Ci/mmol	1	2% ethanol	5 °C		NET512V
Total nucleic acid proliferation	Thymidine, [2-^{14}C]	>50 mCi/mmol	0.1	Steri-packaged, aqueous solution	5 °C		NEC156
	Thymidine, [6-^{3}H]	>10 Ci/mmol	1	Steri-packaged, aqueous solution	5 °C		NET355
		5-6 Ci/mmol	1	Steri-packaged, aqueous solution	5 °C		NET355L
DNA probe labeling	Deoxythymidine 5’ triphosphate [methyl - ^{3}H]	10-25 Ci/mmol	1	50% ethanol	-20°C		NET221H
		70-90 Ci/mmol	1	50% ethanol	-20°C		NET221X
		70-90 Ci/mmol	2.5	10 mM tricine buffer pH 7.6	-80°C		NET221A
		90-120 Ci/mmol	2.5	10 mM tricine buffer pH 7.6	-80°C		NET520A
		90-130 Ci/mmol	1	50% ethanol	-20°C		NET520V

Guidelines for choosing a thymidine radiochemical from the table above:

- Primary application
    - Most cell proliferation assays measure DNA proliferation (incorporation of radiolabeled thymidine into DNA, specifically)
    - Total nucleic acid proliferation can also be studied using a thymidine that is radiolabeled, but not on the methyl group.
    - DNA probes are created by incorporation of deoxythymidine triphosphate (dTTP)

- Compound

  Either ^{14}C-labeled thymidine or ^{3}H-thymidine can be used in proliferation assays. ^{14}C has higher energy compared to ^{3}H. ^{14}C also has higher efficiency compared to ^{3}H in liquid scintillation counting. Your radioactive license may restrict you to one radioisotope or the other. You will want to consult your radiation safety officer when selecting a radioisotope for your assay.
- Specific activity
    - Specific activity indicates how much radioactivity there is per molecule. The units for specific activity in the table above are Curies per millimole of thymidine, or milliCuries per millimole of thymidine. The theoretical maximum specific activity for ^{3}H is ~29 Ci/mmol. Because there are multiple possible H labeling positions in these products, the specific activity of some ^{3}H thymidine products will be greater than the theoretical maximum specific activity for ^{3}H. This indicates that on average, each thymidine molecule has more than one tritium. The theoretical maximum specific activity for ^{14}C is ~62 mCi per millimole of ^{14}C. Because there is only one possible carbon labeling position on these products, products with a specific activity that approaches the theoretical maximum specific activity for ^{14}C indicate that nearly every thymidine molecule is labeled with ^{14}C.
    - If you need your assay to be very sensitive, chose a product with high specific activity (for the given radioisotope).
    - Specific activity can always be decreased by adding more of the same “cold” (unlabeled) thymidine. This will increase the molar concentration of thymidine.
- Radioactive concentration
    - Radiochemical concentration indicates the amount of radioactivity per volume. If your protocol tells you to add a certain amount of Curies to a reaction, you will need to use the radioactive concentration to determine how much to pipette.

- Packaging buffer
    - Thymidines that are packaged in ethanol tend to have a longer shelf-life, however, ethanol can be toxic to cells. You may need to evaporate off any ethanol prior to using in an assay.
    - Products that are “steri-packaged” are prepared with additional precautions to substantially reduce product bioburden and enhance product stability. PerkinElmer makes no warranties, whether expressed or implied, with respect to the sterility or non-pyrogenicity of these or any products.
- Notes
    - Some products have explicit recommended use times, because degradation studies have shown the chemical structure of the product degrades to the extent that it is no longer recommended for its intended application after the indicated time frame. The packaging buffer influences the shelf-life of the product. Thymidine packaged in ethanol will have a longer shelf-life than aqueous thymidine. Please refer to the product technical data sheet for more information.