

1989 Toyota Supra Turbo Oil Spectrum Analysis

(levels in ppm - parts per million) →																	(SAE)	←-- (durability) --→		←----- (oil condition) -----→			←- (contamination) -→			
					Copper	Iron	Chrome	Lead	Aluminum	Silicon	Moly	Sodium	Magnesium	Tin	Zinc	Boron	Viscosity	Alkalinity	Centistoke	Oxidation	Nitration	Sulfur	Water	Antifreeze		
Date	Mileage	ΔMileage	Oil	Weight	Cu	Fe	Cr	Pb	Al	Si	Mo	Na	Mg	Sn	Zn	B	VIS	TBN	cSt	OXI	NIT	SUL	W	A	Notes	
08/25/1997	75964	900	Castrol GTX	10W30	12	38	8	-	11	52	5	5	420	1	819	0	20	-	-	-	-	-	N	N	Elements wear levels appear to be normal.	
10/21/1997	77473	1509	Castrol GTX	10W30	10	20	4	-	4	23	2	3	399	0	839	12	20	-	-	-	-	-	N	N	Si slightly high. All else appears normal.	
12/15/1997	78782	1309	Castrol GTX	10W30	5	15	3	-	3	15	1	2	453	0	867	3	20	-	-	-	-	-	N	N	Elements wear levels appear to be normal.	
03/06/1998	79997	1215	Castrol GTX	10W30	3	10	2	-	2	11	1	2	442	0	884	1	20	-	-	9%	-	20%	N	N	Elements wear levels appear to be normal. <u>Switched to Redline 10W30.</u>	
06/23/1998	82046	2049	Redline	10W30	18	39	10	-	11	16	667	11	366	2	1250	13	n/a	-	-	19%	-	5%	N	N	Values appear normal for new oil - see below	
07/10/1998	"virgin sample"		Redline	10W30	0	0	0	4	12	32	848	10	420	0	1366	18	n/a	n/a	n/a	n/a	n/a	n/a	N	N	Values appear normal for new oil.	
08/21/1998	84815	2769	Redline	10W30	17	21	6	-	11	15	767	12	379	3	1274	0	n/a	-	-	89%	-	0%	N	N	Elements wear levels appear to be normal. High OXI is due to sitting for a month.	
10/19/1998	88352	3537	Redline	10W30	14	19	7	-	12	15	794	16	422	1	1349	0	n/a	-	-	27%	-	7%	N	N	Elements wear levels appear to be normal based on trend. Oil condition acceptable.	
03/02/1999	91934	3582	Redline	10W30	13	24	12	-	12	16	844	17	477	1	1465	0	20	-	-	72%	69%	50%	N	N	Elements wear levels appear to be normal for trend. Chrome is slightly high.	
06/01/1999	94377	2443	Redline	10W30	8	21	12	13	12	17	692	14	459	1	1210	19	30	-	-	70%	66%	49%	N	N	Elements wear levels appear to be normal for trend. <u>Switched to Mobil 1 Tri-Synthetic.</u>	
06/09/1999	"virgin sample"		Mobil 1 Tri-Synthetic	10W30	0	0	0	0	0	2	1	4	1210	0	646	375	n/a	12.5	10.5	n/a	n/a	n/a	N	N	Values appear normal for new oil. Particle count normal. Less MoS ₂ than Redline. TBN is good; cSt falls between 9.3 - 12.5 range for SAE30 @ 100°C (ASTM D445)	
06/09/1999	(particle count)		>5μ = 6,018		>10μ = 954		>15μ = 222		>20μ = 83		>25μ = 43		>50μ = 7		>75μ = 1		>100μ = 1		ISO CODE: 20/15						Zn, B and Mg are oil additives. These IR #s normal when switching oils. All else normal. No oil sample taken. ΔMileage insignificant.	
08/04/1999	96880	2503	Mobil 1 Tri-Synthetic	10W30	5	10	9	6	3	8	76	7	1101	3	709	177	n/a	-	10.4	22%	70%	11%	N	N	Pre-Vegas99 Trip oil change...	
09/13/1999	97624	744	Mobil 1 Tri-Synthetic	10W30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Elements wear levels appear to be normal. First sample of TRD filter. Vegas99 Trip.	
10/04/1999	100283	2659	Mobil 1 Tri-Synthetic	10W30	4	8	4	3	2	7	6	6	1312	0	694	210	n/a	-	10.3	23%	68%	0%	N	N	Elements wear levels appear to be normal. TRD oil filter. Negative for fuel. ST=88ppm.	
02/11/2000	102844	2561	Mobil 1 Tri-Synthetic	10W30	4	10	8	4	2	7	2	6	1168	0	651	63	n/a	-	9.9	36%	0%	0%	N	N		
Total Break-In Miles:		27780																								

Wear Elements:

Copper (Cu) - Bearings, thrust washers, bushings, bronze and brass parts, oil coolers.

Iron (Fe) - Rust, gears, shafts, cylinders, valve train components, pistons in some applications.

Chrome (Cr) - Piston rings, Cr plated crankshafts, Cr plated exhaust valves, roller & ball bearings.

Lead (Pb) - Overlay in main and rod bearings, turbocharger bearings, camshaft bearings, bushings, in some applications.

Aluminum (Al) - Bearings, thrust washers, fuel pump lifters, dirt entry from clay soils, converter, pump bushings, pistons.

Silicon (Si) - Contamination from dirt or dust entry. Excessive amounts can greatly accelerate component wear (silicone is used in some grease and as an oil additive).

(Normal Level ~20. Present in lube grease and RTV sealant)

Moly (Mo) - Piston ring coating in some engines, additive in some oils. (Coatings/ARP lube)

Sodium (Na) - Inhibitor leaking from cooling system, oil additive, environmental contaminant (salt water)

Magnesium (Mg) - If found in trans oil can indicate brake comp wear. Also, lube oil detergent additive.

Tin (Sn) - Piston plate coating, overlay of connecting rod and crankshaft main bearing.

Zinc (Zn) - Lube oil wear and oxidation inhibitor additive.

Boron (B) - Supplementary coolant inhibitor and lube oil additive.

Viscosity (VIS) - Represents an oil weight classification by grade.

Contamination:

Water (W) - Can promote oil oxidation, rust and impair the oil's ability to lubricate properly.

A trace can be normal condensation.

Antifreeze (A) - Any amount is unacceptable, may cause oil to thicken. A positive test could indicate antifreeze in the oil or contamination from outside source. Also, some additives in the new oil may cause the chemical test to turn positive.

Oil Condition Analysis:

Total Base Number (TBN) - The measure of acid-neutralizing capacity an oil contains.

Centistoke (cSt) - Represents oil flow time through calibrated glass capillary tube at a standard temp.

Soot (ST) - An excellent indicator of combustion efficiency, a by-product of combustion, and found in used engine oils. An insoluble particulate that can plug oil filters and deplete the dispersant additives in the oil.

Oxidation (OXI) - Helps to determine serviceability of the lubricating oil. Reported in Percent of allowable. Oil oxidizes with age and service, and from improper operating conditions.

The results are an increase in viscosity and sludge and varnish deposits.

Nitration (NIT) - Reaches problem levels only in natural gas engine. Nitrogen compounds are formed, resulting from the combustion process, contaminating the oil. High nitrogen causes oil thickening and plugged filters. Nitration in diesel engines is abnormal and is an indication of blow-by.

Sulfur Products (SUL) - By-products of diesel fuel combustion that contaminate the oil. These by-products are corrosive and deplete the neutralizing properties of the oil.